REPORT ON THE AGRICULTURAL ACTIVITIES OF GOVERNMENT IN BIHAR AND ORISSA FOR THE YEAR 1917-18.

Annual Report of the Professor of Agriculture, Sabour.

Charge.—The office of the Professor of Agriculture was under my charge throughout the year, and I also officiated as Principal of the College during Mr. C. S. Taylor's absence on leave from the 5th May to the 20th July 1918. There was no change in the Provincial staff. A demonstrator was recently sanctioned by Government and the late Babu Somesh Chandra Dutta, District Agricultural Inspector, was appointed, but I regret to have to report that he died a few weeks after taking up this appointment. His place has now been filled by Babu Dwarka Nath Moitra, a passed student of the Nagpur Agricultural College and an officer of the Bengal Agricultural Department. The two posts of Farm Overseers which fell vacant during the year were given to ex-students of this College.

Training.—The Local Government has sanctioned two stipends of Rs. 20 per mensem for students of this Province to undergo a preliminary training of 1 to 2 years on the Sabour Farm, prior to joining the College Certificate Course. Two students were selected by the Director of Agriculture in consultation with the Agricultural Officers at Sabour, but one student left soon after joining, and applications for the vacancy have been called from the District Agricultural Associations of the Bhagalpur Division.

Leave.—Mr. Chatterji, Farm Superintendent, was granted 44 days' privilege leave and the late Babu Somesh Chandra Dutta, Agricultural Demonstrator 3 months' medical leave.

Tours.—I was on tour for 102 days and the District Agricultural Inspectors of Bhagalpur and Purnea for 126 and 136 days respectively. Babu Nirmal Deb, District Inspector of Bhagalpur, was unfortunately forbidden to tour for 6 months by the medical authorities from March and the district work suffered to a very great extent in consequence. Mr. Sil was also away from Sabour for 15 days in connection with the College students' annual tour to the various Provincial Farms.

Education.—The three year Diploma course came to an end this year; seven students out of a total of nine were successful in the final examination and were awarded the college Diploma: one of the failed students was awarded a certificate. In the Certificate Course eight students out of the twelve passed out of the college while eleven of the students of the 1st year were promoted to the 2nd year class. The external examiner for both the Diploma and Certificate examinations was Mr. W. Roberts, Principal of the Punjab Agricultural College. Forty students of the College are under training this year in the 1st year Certificate class.

Short Course students.—This course has not attained the success expected of it as no students joined in 1917, while only 3 students have joined this year, the reason being that although there is small demand for trained agriculturists of this class the men can either not spare the time as they have to look to their own cultivation, or are unwilling to leave their houses for a period of 3 to 4 months.

College Museum.—A few more models have been added to the Agricultural section of the College Museum and a good many samples of the paddies grown in this Province have been received from the Deputy Directors of the Department. Small quantities of seed of all the crops grown in this Province together with a good many of those grown in other parts of India have already been included.

Demonstration area.—This area has again been increased this year and we have now nearly three times the number of original plots with a corresponding increase in the number of demonstrations. The most important and convincing conclusion drawn from the results of the experiments is that water

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(Irrigation) is the limiting factor in economic crop production under prevailing conditions during the *rabi* season, and that the additions of soluble fertilziers, e.g., Chili-saltpetre will further increase the yield. A series of experiments have also been laid out with "Humogen" which has been supplied through the courtesy of Messrs. Graham Co., Calcutta.

Model Farm Area.—A small area of 6 acres has been set aside for teaching the students farming from a business point of view as it was found that one man with a pair of bullocks could cultivate this acreage provided a suitable cropping scheme was adopted. Half of the area is cultivated according to improved methods, and the other half according to local custom. There are altogether 24 plots in two series and for each method and system the plots are duplicated. A six year rotation has been adopted with a view to maintaining the fertility of the soil and not requiring too great a demand on labour, while the main points connected with Farm Management, e.g. profits from different crops in the rotation, effect of the cropping on the fertility of the soil, cost of equipment, its wear and tear, division of labour and various other points have been kept in view, so that in time this area will afford a practical demonstration of farming on an economical and scientific basis to the students of the College. A good many details have had to be modified during the year, but this was to be expected.

Sabour Farm.

Cropped area.—The Sabour Agricultural Experimental Station is situated in latitude 25° 15′ 40″ North and longitude 87° 2′ 42″ East and was established in 1907 both for experimental purposes and for affording a practical training to the students of the Agricultural College. The Farm comprises an area of about 190 acres, and of this area about 160 are arable. About 53·30 acres were under *bhadoi* crop, 32·70 acres under *aghani* paddy, 130·66 acres under *rabi* crops, and 71·30 acres were double-cropped. The Farm area does not include the grazing lands as these are part of the college compound, but they are fenced in to prevent the encroachment of outside cattle.

Soil.—The soil differs considerably in various sections of the Farm but may be roughly classed as loamy, clay loam and clay. Most of the Northern area may be said to fall under the last named, and generally carries good paddy crops. The cultivation of the lighter lands of the Southern section for the last seven years show that the texture of the soil requires considerable improvement, as their moisture retaining capacity is very low, and the continuous application of organic matter has not improved it to any appreciable extent at present. A recent experiment with irrigation proved that water was the limiting factor during the *rabi* season, and the importance of improving the moisture retaing capacity of the soil cannot be over-estimated. The table below is a detailed analysis of the soil.

Statement showing composition of soils of the Sabour Farm.

Serial No.	Reference number of Block.	Number of soil samples taken for analysis.	Essential Soil-constituents, Range in variation. From maximum. Available P_2O_5 %	From maximum. Available K_2O %	From maximum. N %	To maximum. Available P_2O_5 %	To maximum. Available K_2O %	To maximum. N %	Average percentage. Available P_2O_5 %	Average percentage. Available K_2O %	Average percentage. N %	Remarks.
1	2	3	4	5	6	7	8	9	10	11	12	13
1	A	16	·047	·023	·090	·026	·018	·050	·035	·020	·067	
2	B	16	·037	·027	·070	·005	·014	·045	·017	·080	·057	
3	C	12	·014	·034	·065	·009	·023	·047	·011	·029	·057	
4	I	27	·039	·023	·081	·021	·006	·046	·028	·012	·059	
5	J	19	·019	·014	·058	·013	·008	·049	·016	·012	·055	
6	K	70	·013	·017	·095	·008	·007	·052	·011	·011	·070	
7	Orchard	3	·024	·010	·062	·016	·007	·040	·019	·009	·054	
8	L	54	·126	·061	·007	·036	·007	·063	·084	·029	·084	

Season.—The table below gives the rainfall for the twelve months under report, and also the average for the last nine years. The season on the whole was a failure, as although we had rain in May which allowed of the *bhadoi* crops being sown early, subsequent floods destroyed the maize crop in the low-lying areas which had to be fed off green. Very good *hathia* showers were received in October and the *rabi* germination was extremely good, but unfortunately no winter rain fell and the crops suffered considerably from draught in consequence.

TABLE No. II.

Statement showing distribution of rainfall at Sabour, 1917-18.

Month.	Rainfall during 1917-18.			Number of rainy days during 1917-18.			Heaviest in 24 hours.		Average for the last 10 years.	
	Fortnightly distribution.	Amount.	Total.	Fortnightly distribution.	Number of days.	Total.	Amount.	Date.	Rainfall.	Number of rainy days.
1	2	3	4	5	6	7	8	9	10	11
July 1917	1st Fortnight ...	5·93	10·71	1st Fortnight ..	5	13	3·45	4th July 1917	10·46	16·04
	2nd ,, ...	4·78		2nd ,, ...	8					
August ,,	1st ,, ...	10·25	11·86	1st ,, ...	12	16	3·33	2nd August ,,	11·11	18·06
	2nd ,, ...	1·61		2nd ,, ...	4					
September ,,	1st ,, ...	5·71	8·43	1st ,, ...	8	14	1·80	13th Sept. ,,	6·96	12·50
	2nd ,, ...	2·72		2nd ,, ...	6					
October ,,	1st ,, ...	4·80	5·86	1st ,, ...	4	6	2·19	7th October ,,	4·17	4·88
	2nd ,, ...	1·06		2nd ,, ...	2					
November ,,	1st ,, ...	...	...	1st ,, ...	...	...	...	.....	0·82	1·24
	2nd ,, ...	...		2nd ,, ...	...					
December ,,	1st ,, ...	...	...	1st ,, ...	...	...	...	.....	0·23	0·22
	2nd ,, ...	...		2nd ,, ...	...					
January 1918	1st ,, ...	...	0·06	1st ,, ...	...	1	0·06	20th Jany. 1918	0·11	0·69
	2nd ,, ...	0·06		2nd ,, ...	1					
February ,,	1st ,, ...	...	...	1st ,, ...	...	...	...	.....	0·68	1·94
	2nd ,, ...	...		2nd ,, ...	...					
March ,,	1st ,, ...	...	...	1st ,, ...		...	...	.....	0·50	2·01
	2nd ,, ...	...		2nd ,, ...	...					
April ,,	1st ,, ...	0·70	1·25	1st ,, ...	1	3	0·70	2nd April 1918	1·02	2·56
	2nd ,, ...	0·55		2nd ,, ...	2					
May ,,	1st ,, ...	1·80	2·46	1st ,, ...	3	4	1·63	4th May ,,	2·645	5·486
	2nd ,, ...	0·66		2nd ,, ...	1					
June ,,	1st ,, ...	3·37	10·37	1st ,, ...	7	13	2·62	25th June ,,	10·625	15·487
	2nd ,, ...	7·00		2nd ,, ...	6					

Receipts and Charges .—The total expenditure on the Farm amounted to Rs. 14,862-14-1 and the receipts to Rs. 4,888-0-5. The cost of control, non-recurring Charges, and Office Expenses amounted to Rs. 8,431-15-4 which if deducted from the total expenditure practically gives the actual cost of cultivation of both the experimental and non-experimental areas. Of the two statements below the second statement shows that if only the cost of actual cultivation is considered the profits from the non-experimental area more than pay for the loss incurred in investigational work. The receipts on the Farm for the last two years however have not been satisfactory as the yield of both the *bhadoi* and *rabi* crops have been poor on account of the unfavourable seasons we have been having.

Statement showing the Receipt and Expenditure of the Sabour Farm for 1917-18.

Receipts.	Amount.	Expenditure.	Amount.
1	2	3	4
	Rs. a. p.		Rs. a. p.
Sale proceeds of Farm produce.	3,196 15 2	I. Non-recurring—	
		Purchase of cattle ...	887 1 9
Miscellaneous receipts ...	772 10 0	Purchase of implements ...	1,068 4 0
Sale proceeds and old store	...	Laying out	226 13 3
Value of produce in hand	3,032 6 9	Railway and Steamer freight	40 13 6
Amount of outstanding bills	295 0 9		
	7,297 0 8		2,223 0 6
Deduct—		II. Recurring—	
		(*a*) Office expenses—	
Value of old produce of 1916-17.	2,018 4 0	Service postage, etc. ...	42 5 0
Amount of outstanding bills	...	Hot weather charges ...	24 11 9
On 1st July 1917, since realised.	390 12 3	Office contingencies ...	326 0 3
		Miscellaneous ...	592 5 3
	2,409 0 3		985 6 3
Net receipts ...	4,888 0 5	(*b*) Superintendence and control—	
		Establishment ...	5,223 8 7
			5,223 8 7
		(*c*) Experimental—	
		Purchase of fertiliser ...	305 11 3
			305 11 3
		(*d*) Cultivation—	
		Feed of cattle ...	863 9 3
		Purchase of seeds ...	129 3 3
		Wages of cultivators ...	5,132 7 0
			6,125 3 6
		Total expenditure ...	14,862 14 1

Statement showing the classification of the charges under Experimental and Non-experimental work at the Sabour Farm during 1917-18.

Experimental. (Area 95·60 acres).	Amount.	Non-experimental. (Area 190·90 acres.)	Amount.
1	2	3	4
	Rs. a. p.		Rs. a. p.
Seeds	252 13 5	Seeds	546 15 7
Manures	159 5 7	Manures	38 5 8
Labour	929 10 8	Labour	1,448 14 11
Feed of cattle ...	238 13 9	Feed of cattle ...	482 0 9
Maintenance	6 15 2	Maintenance	20 15 10
Miscellaneous ...	...	Miscellaneous ...	...
Total ...	1,587 10 7	Total ...	2,537 4 9
Receipts ...	1,151 3 5	Receipts ...	3,703 9 1
Loss ...	436 7 2	Profit ...	1,166 4 4
		Total profit Rs. 729-13-2	

Purchase of Cattle. —The purchasing of young bullocks to replace the old animals which had been in work since 1907 was completed this season by the purchase of 4 pairs at the Barahpur Fair. Three pairs of bullocks however had to be sold to the Special Mica Officer at Kodarma, and with this money these animals will be replaced this winter.

Seed Store.—This branch of the Farm has developed considerably within the last 12 months as the District staff have made heavy demands on it, and the question of acquiring land for a seperate Seed Farm with a suitable seed-store godown has been sent up for consideration.

EXPERIMENTS.

Paddy (*Oryza Sativa*).

Variety trial of paddy .—A few varieties of Philippine paddies were received for comparative trials with the standard varieties of the Farm in 1915-16, but the trials of the last three seasons conclusively show that none of these varieties are deserving of special notice. On the other hand, two varieties of late *Aman* paddy, viz., *Indarsail* and *Chikansar*, which have been received from the Bengal Department of Agriculture have proved heavier yielders than the Farm *Kalamdan* variety. The *Indrasail* paddy has been claimed by Bengal to be the more desirable of the two, but this is not very certain at Sabour as so far the *Chikansar* variety has more than held its own. This season the Philippine paddies have been rejected from the trial which now only comprises the two Bengal varieties and the Farm *Kalamdan*.

Statement showing the result of the variety-trial of paddy (*Oryza Sativa*), 1917-18.

Serial No.	Name and numbers of the variety of paddy tried.	Outturn.		Remarks.
		Grain.	Straw.	
1	2	3	4	5
		lb. oz.	lb. oz.	
1	Dahia	75 12	194 0	Standard early *Aman* of the farm.
2	Philippine, 530 ...	94 0	217 0	Early varieties.
3	Ditto, 635 ...	91 8	215 8	Ditto.
4	Ditto, 663 ...	85 8	222 12	Ditto.
5	Kalamdan	83 0	188 12	Standard late *Aman* (medium) of the farm.
6	Philippine, 813 ...	28 2	169 5	Late varieties.
7	Ditto, 527 ...	28 14	144 0	Ditto.
8	Indrasail	118 5	309 10	The new variety of late *Aman* (medium coarse) introduced from Bengal.
9	Philippine, 692 ...	38 4	171 7	Late varieties.
10	Ditto, 447 ...	72 12	351 5	Ditto.
11	Chickansar	120 14	324 0	Fine late *Aman* paddy.

Alternate and continuous green manuring of paddy lands. —The process of enriching paddy lands by ploughing in a green manure crop such as *Dhaincha* (*Sesbania aculeata*) or Sun hemp (*Crotolaria juncea*) has been demonstrated in the districts with success, and it was considered advisable to ascertain as early as possible at what periods or intervals these lands should be green-manured. The same experiment conducted for three years shows that the land can be profitably treated in this manner for three successive seasons without any injurious effect to the crop and that the addition of bone-meal and lime tends to increase the outturn still more.

Statement showing the result of Alternate and Continous green manuring with Sun hemp (*Crotolaria juncea*) in conjunction with lime and bone-meal, 1917-18.

Serial No.	Factor in the experiments.	Outturn.						Remarks.
		With lime 10 mds.		With bone-meal 5 mds.		Green-manuring alone.		
		Grain.	Straw.	Grain.	Straw.	Grain.	Straw.	
1	2	3	4	5	6	7	8	9
		lb. oz.	lb. o.	lb. oz.	lb. oz.	lb. oz	lb. oz.	
1	Alternate green-manuring	31 12	348 2	25 4	342 0	35 14	307 4	
2	Continuous	42 0	294 4	53 12	324 0	33 4	277 6	

Sugarcane (Saccharum Officinarum).—The Economic Botanist has handed over eight groups of the indigenous canes of this Province consisting of 24 varieties for a comparative study of their agricultural characteristics. The field trial is being made in duplicate plots, but as the area under the crop was as much as 6 acres, the duplicate plots could not be planted by the end of January. Irrigation facilities were also not adequate for so large an area and a good many plants failed to germinate. The trial made this year however will enable us to judge of the most promising varieties and eliminating the undesirable ones. This reduction of the number of varieties will reduce the area to an extent when it can be efficiently managed by the Farm.

Variety trial of Barley (Hordeum Vulgare).—The same variety trial of barley was conducted again this year and the result showed for the second time that the improved Partabgarh variety was greatly superior to all the others. There was no rain in January and February and it was expected that the local variety would stand the drought best, but the Partabgarh variety gave an outturn of more than twice that of the local and confirmed last year's results. The other varieties cannot be recognized as being of any particular value as they cannot resist drought to any extent, a factor which the south of this Province has to contend against.

Statement showing the result of the variety-trial of Barley, 1917-18.

AREA = ·10 ACRE.

Serial No.	Name of variety.	Outturn.		Remarks.
		Grain.	Straw.	
1	2	3	4	5
		lb. oz.	lb. oz.	
1	Improved Partabgarh ...	88 0	105 0	
2	Sultanpur	31 0	38 0	
3	Azamgarh	19 0	24 0	
4	Ballia	15 0	21 0	
5	Punjab	13 0	16 0	
6	Red, huskless	15 8	21 0	
7	Murli	23 8	29 0	
8	White, huskless	21 0	26 0	
9	Local	33 0	42 0	

Variety-trial of Gram (Cicer Arietinum).—This variety-trial was very carefully conducted as no uniform plots could be obtained and each variety had to be sown in each of the plots. The crop when harvested was thrashed and weighed in the fields without being carted to the threshing floor. The *Kabuli* gramproved a failure but it might have done better had there been rain in January. The trial on the whole gives indications of the local variety being improved upon but the work on this crop is only in its initial stage. The Botanical Staff are contemplating crossing the local variety with the most promising of Mr. Howard's types, and it is hoped that a heavier yielding variety can be produced with the hardy character of the Local. Besides

this experiment these varieties were also grown in the lighter soil of the southern section where the heaviest outturn obtained was 1680 pounds per acre from type No. 18 while type No. 24 produced 1,416 pounds per acre. These outturns were double those of any other variety and were sown in plots of 0·37 acre each. They were not put down as an experiment in these areas though all the varieties were sown in contiguous plots. In the absence of check and duplicate plots no conclusion can be drawn from these outturns with any degree of certainty.

Variety trial of gram (Cicer Arietinum).

AREA = $\frac{1}{10}$TH ACRE — GRAM.

Serial No.	No. of plot.	Patna gram grain.	Patna gram Bhusa.	Local gram grain.	Local gram Bhusa.	Yellow gram grain.	Yellow gram Bhusa.	Gram T 18 grain.	Gram T 18 Bhusa.	Gram Black grain.	Gram Black Bhusa.	Gram Kabuli grain.	Gram Kabuli Bhusa.	Gram T 24 grain.	Bhusa.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		lb. oz.	lb. oz.	lb. oz.	lb. oz.	lb. oz.	lb. oz.	lb. oz.							
1	L 5	7 12	7 12	7 0	7 4	9 4	10 12	6 4	10 0	7 4	8 8	2 8	5 0	Not sown.	
2	L 6	13 12	13 8	5 12	17 8	18 4	23 0	18 12	23 8	22 4	22 12	2 0	3 8	Do.	
3	L 11	23 0	19 0	28 8	28 0	23 0	23 8	21 4	21 0	18 8	19 0	5 4	7 8	Do.	
4	L 13	5 8	7 4	4 12	5 12	8 4	10 4	6 0	8 8	6 12	8 4	3 0	4 12	6 12	18 4
5	L 19	14 0	12 8	23 8	23 8	20 8	20 4	12 0	14 0	19 0	19 0	2 0	4 0	9 0	11 4
6	L 20	20 4	28 0	22 4	17 4	23 0	26 8	15 4	19 0	16 12	17 12	10 4	19 12	Not sown.	
7	L 25	19 0	16 8	15 4	16 0	13 8	15 12	13 8	12 12	13 0	13 0	2 4	4 0	Do.	
8	L 26	6 4	6 0	4 0	4 4	7 0	7 12	5 0	5 12	7 12	7 8	5 4	9 0	7 0	7 12
9	L 35	12 8	13 4	7 0	10 8	11 0	11 8	12 4	11 8	11 4	11 8	7 0	10 0	9 0	8 12
10	L 36	20 0	18 0	10 0	12 8	16 0	18 12	23 4	29 0	10 12	10 0	8 0	13 0	3 12	13 8
11	L 41	17 0	13 0	21 0	20 0	13 0	12 0	10 0	12 8	11 12	13 8	8 8	18 4	12 4	11 8
12	L 42	14 0	10 8	8 0	7 0	8 4	8 12	9 0	7 8	9 0	9 0	3 4	5 8	9 4	13 12

Rotation Area. —The area which has been set aside for rotational experiments and which is being brought under uniform conditions still shows a difference this year, in spite of having been manured consistently for the last 5 years but a slight improvement however is noticeable. The outturn of the whole area is disappointing but this is only due to lack of moisture as we have no irrigation facilities for so large an area.

CATTLE FEEDING TRIALS WITH RICE-MEAL.

The preliminary trials with rice-meal showed last year that it alone could not very well take the place of oats in the feed concentrates either of the cows in full milk, or of the hard and medium worked bullocks of the Sabour Farm. Further trials with the material were therefore made during the year under report to find out whether rice-meal could be economically utilized as cattle food without any detriment to their health and performance when it was combined with some other nitrogenous food grain, e.g., peas (*Pisum arvense*). Peas was selected because it was relatively cheap consistent with its protein content as compared with other pulses commonly fed to cattle. The trial was made with

four milch cows and sixteen bullocks of the Sabour Farm. The selection and grouping, etc., of the animals and records of their performance were done as in the last year. The trials extended to 16 weeks in the case of the cows, and 6 weeks in the case of the bullocks, but the actual experimental periods in each of the above cases were respectively 12 weeks and 4 weeks, the remaining periods being devoted to pre-experimental, and post-experimental observations. The rations both for the cows and bullocks consisted of two items, viz., (*a*) basal consisting of the whole of the roughage and part of the concentrates, and (*b*) additional consisting of the concentrates alone as shown below.—

AVERAGE RATION.

For milch cow.		For Draft bullock.			
		Hard-worked		Medium worked.	
Basal.	Additional.	Basal.	Additional.	Basal.	Additional.
1	2	3	4	5	6
Juar fodder =30lb. Mixed Bhusa =6 lb. Mustard oil cake=1½ lb.	Oats=4½ lb. (during standard feed period) or rice-meal=2 lbs. Peas=2 lb. (during expt. feed period.	Wheat Bhusa =20 lb. Mustard oil cake=1½ lb.	Oats=4 lb. (standard fed lot) or Rice-meal=2 lb. Peas =2 lb. (for expt. fed lot.)	Wheat Bhusa =20 lb. Mustard oil cake=1½ lb.	Oats=3 lb. (for standard fed lot) or Rice-meal=2 lb. Peas =2 lb. for expt. fed lot).

In computing the above rations according to the Wolff-Lehman standard the basal ration was kept as far as possible to the maintenance standard and the additional ration to the performance standard. The following tables give a summary of the results obtained :—

Effect of rice-meal on milch cows.

Kind of concentrate.	Live weight.	Milk yield.	Average fat content.
1	2	3	4
	Cwt. qr. lb.	Lb. oz.	
Oats	23 1 6	1,864 4	5·1 per cent.
Rice-meal and peas	23 1 15	1,789 6	4·8 „
Increase (+) or decrease (—) due to the rice-meal and peas.	+9	—74 14	—0·3 „

Effect of rice-meal on Draft bullocks.

Kind of concentrate.	Hard-worked bullocks.				Medium-worked bullocks.			
	Weight before.	Weight after.	Increase in weight.	Percentage of increase.	Weight before.	Weight after.	Increase in weight.	Percentsge of increase.
1	2	3	4	5	6	7	8	9
	Cwt. qr. lb.	Cwt. qr. lb.	Lb.		Cwt. qr. lb.	Cwt. qr. lb.	Lb.	
Oats	26 2 4	27 0 16	58	1·9 per cent	28 2 0	28 2 13	13	0·4 per cent.
Rice-meal and peas	32 0 26	32 1 17	19	0·5 „	26 3 6	26 3 12	6	0·2 „

It is thus seen from the above tables that—

(*a*) there is no decrease in live weight of the milch cows due to rice-meal and peas but on the other hand there is a margin though small of increase due to this feed;

(*b*) there is slight decrease in milk yield due to rice-meal and peas which amounted to about 75 lb. in 6 weeks with 4 cows and this corresponds to a decrease of only 7 ounces per head per day;

(*c*) the fat content of milk appears to be also slightly affected for the worse by the rice-meal and pea diet;

(*d*) in the case of both the hard and medium worked bullocks rice-meal and peas cause an increase in their live weights.

The following tables give some idea of the financial aspects of the question:—

I.—MILCH-COW.

Kind of food.	Cost of food.	Outturn obtained.	Cost to produce 10 lb. of milk.	Remarks.
1	2	3	4	5
	Rs. a. p.	Lb. oz.		
Rice-meal peas	28 3 1	1,789 6	30·2 pies	With 4 cows for 6 weeks.
Oats	36 4 7	1,864 4	37·3 „	

II.—DRAUGHT BULLOCKS.

Kind of food.	Cost of food.	Hours of work done.	Cost of food per hour of work.	Remarks.
1	2	3	4	5
	I.—Heavy-workd.			
	Rs. a. p.			
Rice-meal and peas ...	18 6 11	896	3·9 pies	With 4 bullocks.
Oats	23 3 1	896	4·9 „	Ditto.
	II.—Medium-worked.			
Rice-meal and peas ...	16 8 8	560	5·6 pies	With 4 bullocks.
Oats	20 9 4	560	7·0 „	Ditto.

By the above figures it is shown that—

(*a*) an increased cost in feeding stuffs (oats) gives increased outturns, but this increase in cost is not commensurate with the increased outturn of production, and therefore cannot be justified from an economic standpoint;

(*b*) to produce 10 lb. of milk (the daily average of a good Montgomery cow), about 7 pies more have to be spent in the oat concentrate than in a mixture of an equal quantity of rice-meal and peas;

(*c*) in the case of the bullocks from 1 to 1½ pies more per hour of work per animal has to be spent in the case of the oat feed than with a mixture of rice-meal and peas.

Taking all the aspects of the experiment into consideration, the following general conclusions may be drawn :—

(1) when the cost of feeding is not a consideration oats are better food than an equal quantity of a mixture of rice-meal and peas;

(2) unlike the grain concentrates the cattle have to be accustomed to rice-meal, and therefore the first change in diet to rice-meal and peas is generally attended with a loss in live-weight. But this loss is more apparent than real as the animal soon recovers from this change;

(3) after a short time when the animals get accustomed to a rice-meal diet, a mixture of rice-meal and peas can economically replace an equal quantity of oats in the additional ration of cows in full milk or bullocks in hard work;

(4) a mixture of rice-meal and peas is found to be satisfactory in economically maintaining the live-weight, spirits, willingness for work and milk yield of the animals thus fed ;

(5) when oats are high-priced and the prices of rice-meal and peas are as usual (as in the experiment) the substitution of a mixture of rice-meal and peas for an equal quantity of oats in the food concentrates of live stock may cause considerable saving in expenses;

(6) as rice-meal on account of its high oil content is liable to get rancid after some time and also on account of its laxative effect by its too free use in large quantities, especially during summer, it should be used fresh and in moderate quantities as has been done in the present trials.

Miscellaneous crops.—Howard's *Hibiscus* (*Hibiscus Cannabinus*) type No. 3 proved very successful in south Monghyr and a large area has been sown for seed production this year. Berseem seed (*Trifolium Alexandriam*) was obtained from Mr. Henderson, Imperial Agriculturist, Pusa, but in spite of being grown under irrigated conditions proved a failure. An attempt will be made this coming *rabi* season to grow it in the low-lying paddy plots which are more retentive of moisture. The Raipur and Jabbalpore mustards (*Brassica juncea*) showed that they could only do well if irrigated, otherwise it was advisable to keep to the local *Maghi Ghota*. Amongst the fodder crops Guinea Grass (*Panicum maximum*) and Meth (*Phaseolus Ricciardianus*) can be successfully grown in orchards and the former will afford a certain amount of roughage even if planted in waste lands if they are cultivated between the rows occasionally.

Sabour Dairy Herd.—The Dairy herd has given a profit of Rs. 1,426-3 this year mainly due to most of the cows being in milk, and also to the increase of the herd by the purchase of 8 Montgomery cows and heifers at the Pusa auction in March. Of the latter animals four had been crossed by Ayrshire bulls and each has given birth to a calf since their arrival at Sabour.

The milk yield of the herd amounted to 22,131 lb. 6 oz. against 16,110 lb. produced last season. The value of this increase amounts to approximately Rs. 750 and the increase in the value of the herd excluding the animals purchased from Pusa to Rs. 781.

The following tables give the main points of interest in the maintenance of the herd :—

1. Receipts and Expenditure.
2. Valuation Statement.
3. Increase of herd.
4. Live stock statement.
5. Distribution of animals.

Statement showing the Receipts and Expenditure of the Sabour Dairy for 1917-18.

Receipt.	Amount.	Expenditure.	Amount.
1	2	3	4
	Rs. a. p.		Rs. a. p.
By Sale of milk ...	1,215 6 0	Attendance ...	202 8 3
„ „ Stock ...	...	Coarse feed	601 0 6
By supply of bullocks to the farm.	125 0 0	Concentrate and Salt ...	327 10 0
By decreased value of old herd	324 5 0	Appliances	...
By increased value of new stock (including the value of the Pusa cattle purchased).	2,431 0 0	Medical treatment ...	28 14 0
Outstanding bills (Milk) ...	151 7 3		
„ „ (Stock) ...	150 0 0	Miscellaneous ...	68 15 9
	4,397 2 3	By depreciation on old herd	32 6 6
Deduct—		Purchase of cattle from Pusa.	1,650 0 0
Outstanding bills on 1st July 1917, since realized	59 8 3		
Net receipts ...	4,337 10 0	Total expenditure ...	2,911 7 0

Valuation statement of the Sabour Dairy herd, 1917-18.

Kind of Stock.	Valuation in—		Increase and Decrease.	Remarks.
	1916-17.	1917-18.		
1	2	3	4	5
	Rs. a. p.	Rs. a. p.	Rs. a. p.	
Old herd at Rs. 10 per cent. depreciation	324 5 3	291 14 9	—32 6 6	
Value of the stock raised during 1910-11	1530 0 0	375 0 0		
Ditto ditto 1911-12		772 0 0	+117 0 0	
Ditto ditto 1912-13		500 0 0		
Ditto ditto 1913-14	1,170 0 0	940 0 0	—230 0 0	
Ditto ditto 1914-15	530 0 0	385 0 0	—145 0 0	
Ditto ditto 1915-16	230 0 0	635 0 0	+405 0 0	
Ditto ditto 1916-17	141 0 0	270 0 0	+129 0 0	
Ditto ditto 1917-18	...	...	...	No valuation was possible as as were calvil under 1 year.es
Value of the new stock purchased from Pusa.	...	1,650 0 0	...	

Statement showing the increase of herd since 1910-11.

Serial No.	Year.	Bulls.	Cows.	Bull-calves.	Cow-calves.	Bullocks.	Total.	Remarks.
1	2	3	4	5	6	7	8	9
1	1910-11 ...	1	11	3	3	Nil.	18	This Statemon excludes all losses.
2	1911-12 ...	1	11	5	10	2	29	
3	1912-13 ...	1	13	9	12	2	37	
4	1913-14 ...	2	14	15	11	3	45	
5	1914-15 ...	2	13	14	4	5	53	
6	1915-16 ...	4	20	15	20	7	66	
7	1916-17 ...	3	19	17	25	7	71	
8	1917-18 ...	6	26	15	34	4	84	

Statement of Live-stock for the year ending 30th June 1918.

Bullocks (Sonepur old).	Bullocks (Sonepur new).	Bullocks (Barahpur new).	Bullocks (Montgomery.)	Bulls (Montgomery.)	Cows (Montgomery.)	Cow-calves (Montgomery).	Bull-calves (Montgomery.)	Local Buffaloes,	Remarks.
1	2	3	4	5	6	7	8	9	10
5	35	15	4	7	16	23	10	6	

Statement showing the number, kind, etc., of cattle distributed by the Sabour Dairy to the public during the year 1917-18.

Serial No.	Kind of Cattle.	Name of the animal.	Brand No.	To whom sold.	Date of sale.	Price charged.	Remarks.
1	2	3	4	5	6	7	8
						Rs.	
1	Breeding Bull ...	Boudha ...	408	Manager, Sonbarsa Wards Estate, Madhipura.	12th March 1918 ...	*Nil*	Sent in exchange of the bull "Dholia" (218) which proved to be impotent.
2	Ditto	Singheswar	288	Collector, Purnea ...	15th June 1918 ...	150	...

N. S. M'GOWAN,

Professor of Agriculture.

Annual Report of the Dumraon Agricultural Station for the year 1917-1918.

The Dumraon Agricultural Experimental Station, the oldest in the Province, was established in 1895. It is situated in latitude 25·30 north on land lying either side of the Railway line, just east of Dumraon Railway Station, East Indian Railway. The land is provided by the Dumraon Raj, who meet all the expenses of the Station.

For ten years previous to the opening of the present Farm, the Raj maintained another Experimental Station about 2 miles west of Dumraon, but this was abandoned in 1895, when the present site was selected as more suitable by Dr. Leather, the Imperial Agricultural Chemist.

The area of the Farm is about 30 acres, of which about 24 acres are under cultivation, the remainder being occupied by roads, buildings, etc.

Under the order of the Director of Agriculture, Bihar and Orissa, this Farm, with effect from this year (1918-1919), has been converted into a Seed Farm for the propagation of Pusa wheat.

The soil is a light sandy loam resting on a heavier sub-soil. The following table gives the chemical analysis of the first and second nine inches of the soil :—

Particulars.	First 9 inches.	Second 9 inches.
1	2	3
Insoluble silicates and sand	85·63	80·90
Ferric Oxide	3·82	6·12
Alumina...	5·52	6·50
Lime	·38	2·07
Magnesia	·83	1·17
Potash	·58	·73
Soda	·64	...
Phosphoric Acid	·04	·08
Sulphuric Acid	·02	...
Carbonic Acid	·08	·05
Organic matter and combined water	2·46	2·38
Total ...	100·00	100·00

The Farm is irrigated from the Bhojpur Distributary of the Sone Canal and there is a well in the northern section which can command a limited area.

The total expenditure in running the Farm during the year amounted to Rs. 2,652-10-9. The amount paid into the Treasury during the same period was Rs. 946-12-3.

Certain deductions may be made from the above totals in order to arrive at the approximate cost of the cultivation and up-keep of the Station.

These are detailed below, no account being taken of the expenditure on various miscellaneous items unconnected directly with the maintenance of the Farm.

			Rs. a. p.
Total cost of the Experimental Station for the year 1917-1918.			2,652 10 9
Deduct—			
	Rs. a. p.		
(1) Pay, Pension contribution and Travelling Allowances of the Superintendent and office..	1,101 11 9		
(2) Postage and Telegram charges ...	22 8 0		
(3) Office expenses, furniture, Railway and Steamer freight.	66 6 3		
(4) Purchase of bullocks	132 0 0		
	1,322 10 0		1,322 10 0
Total cultivation cost ...		...	Rs. 1,330 0 9
Total paid into the Treasury during the year 1917-1918.		...	946 12 3
Add—			
(1) Stock in hand on 31st March 1918 ...	424 0 0		
(2) Bills due on 31st March 1918 ...	40 13 9		
	464 13 9		464 13 9
Total Receipts ...		...	1,411 10 0
Deduct—			
(1) Stock in hand on 31st March 1917 ...	309 14 10		
(2) Bills due on 31st March 1917 ...	144 3 3		
	454 2 1		454 2 1
Net Receipts ...		...	957 7 11
Loss ...		...	372 · 8 10

If the above calculations are allowed, a loss of Rs. 372-8-10 is shown, as against Rs. 787-12-5 for the corresponding period dnring 1916-1917.

Character of the Season.

The following table gives the number of rainy days and the rainfall in inches along with a statement showing the average rainfall and the average number of rainy days, during the past 9 years.

Month.	Number of rainy days, 1917-18.	Average number of rainy days for nine years.	Rainfall, in inches, 1917-18.	Average rainfal for 9 years, in inches.
1	2	3	4	5
April	*Nil*	2·22	*Nil*	0·18
May	9	3·00	2·15	0·87
June	14	10·11	5·74	7·67
July	20	17·44	12·75	9·61
August	18	18·44	5·11	12·53
September ...	13	11·22	8·25	7·21
October	5	4·33	4·74	2·38
November	*Nil*	1·22	*Nil*	0·61
December	1	0·77	0·37	0·35
January	1	1·33	0·13	0·18
February	*Nil*	2·55	*Nil*	0·57
March	1	2·11	0·04	0·36
Total ...	77	74·74	39·28	42·52

The year was favourable to the *Kharif* crop but owing to the almost total absence of rain from November to February, the *Rabi* was but little benefited.

EXPERIMENTAL WORK ON THE FARM.

Rice (*Oryza Sativa.*)

I—Manurial Experiments.

The following table gives the result of the manurial experiments on rice :—

Manure applied per acre.	Outturn of grain per acre.	Outturn of straw per acre.	Profit (+) or loss (—) per acre.
1	2	3	4
	lbs.	lbs.	Rs. As. P.
4, 100 lbs. / 50 maunds Cowdung ...	1,691	5,022	+ 42 8 10
Green manuring, Dhaincha (*Sesbania aculeata*).	1,727	4,997	+ 43 13 8
410 lbs. / 5 maunds Castor Cake	1,861	3,946	+ 24 0 2
Unmanured	1,271	3,696	+ 30 4 2

These experiments, which have been in progress for 2 years, were carried out on ⅛th acre plots, the variety transplanted being *Bansphul*, a local medium paddy. Of the 3 manures employed, *Dhaincha* has again this season proved to be the most economical.

MAIZE (*ZEA MAYS*) AND WHEAT (*TRITICUM SATIVUM*)

II—Cultivation Experiments.

This series of experiments were undertaken with a view to finding out whether it would be more profitable in this district to green-manure the wheat crop as has been recommended over certain tracts, or to manure the land with cowdung at the rate of 100 maunds per acre and to recover two crops, viz., a *Kharif* and a *Rabi*.

Three plots of land, each of one acre, were employed. On the first plot which was unmanured, maize was grown followed by wheat.

On the second plot, which had received during June an application of cowdung, at the rate of 100 maunds per acre, two crops, viz., maize and wheat were taken.

On the third plot, which had been green-manured with *Sanai* (*Crotolaria juncea*) wheat alone was taken.

The following table gives the results :—

Treatment.	Outturn per acre.				Profit (+) or loss (—) per acre.
	Maize (Zea Mays).		Wheat (Triticum Sativum).		
	Grain.	Straw.	Grain.	Straw.	
1	2	3	4	5	6
	lbs.	lbs.	lbs.	lbs.	Rs. as. p.
No manure	576	2,078	365	584	+ 6 14 2
8, 200 lbs. / 100 maunds Cowdung per acre	824	2,382	426	676	+24 14 9
Green manure, Sanhemp (*Crotolaria juncea*).	...	...	430	728	+17 13 5

BERSEEM AS A FODDER CROP.

In order to ascertain the value of *Berseem* as a cold weather fodder crop, 1·50 acres of land was broadcasted with *Berseem* seed on standing paddy.

Three cuttings of fodder were obtained during the cold weather and fed to the Farm cattle.

While the outturn of fodder has not been unsatisfactory, the yield of seed did not come up to expectations. As the conditions for the cultivation of *Berseem* are now better understood than before, it is hoped that *Berseem* will prove to be as great an asset as a fodder crop, as it has been in Egypt.

J. ROBINSON,

Deputy Director of Agriculture,
Patna Circle, Bankipore.

Classification of charges under experimental and non-experimental work carried out on the Dumraon Farm during the year ending 30th June 1918.

—	Experimental (Area-0·80 acres).	Non-experimental (Area 23·53 acres).
1	2	3
	Rs. a. p.	Rs. a. p.
Seeds	...	54 10 0
Manures	1 14 0	51 15 9
Labour	11 4 0	289 7 7½
Feed of cattle (including pay of cattle-man) ...	4 7 7	131 10 5
Maintenance (including repair of implements, petty construction and repairs, rent, rates and taxes).	21 8 5	633 4 3½
Miscellaneous Contingencies	1 11 9	50 15 3
Total ...	40 13 9	1,211 11 4
Receipt ...	51 1 10	1,549 4 9
Profit ...	10 4 1	337 9 5
Total Profit ...	...	347 13 6

N. B.—In calculating the profit of experimental and non-experimental works carried out on the Farm the value of bye-products (straw, etc.) as existing at the time of storage has also been included.

Statement showing the receipt and expenditure of the Dumraon Agricultural Station for the year ending 30th June 1918.

Receipt.	Total.	Expenditure.		Total.
1	2	3		4
	Rs. a. p.		Rs. a. p.	Rs. a. p.
Sale proceeds of the produce	873 6 3	(1) Non-recurring—		
Miscellaneous receipt ...	74 15 3	Purchase of cattle ...	132 0 0	
		Railway and Steamer freight	39 2 0	171 2 0
Value of produce in hand on 30th June 1918.	1,059 9 3	(2) Recurring—		
		(a) Office expense—		
Amount of bills outstanding on 30th June 1918.	81 0 6	Service Postage Stamps	18 8 0	
		Office expense ...	20 3 3	38 11 3
Gross receipt ...	2,087 15 3	Total ...		
Deduct—		(b) Establishment—		
Rs. a. p.				
Value of stock in hand on 30th June 1917 794 12 7		Pay and travelling allowance of Superintendent, clerk, peon and chowkidars.	843 2 9	843 2 9
Amount of bills outstanding on 30th June 1917. 171 4 9		(c) Cultivation—		
		Contingent expenditure—		
		Feed of cattle, including pay of cattle-man.	136 2 0	
Total ... 966 1 4	966 1 4	Purchase of seeds ...	82 0 0	
Net Receipt ...	1,121 13 11	Purchase of manures ...	18 10 9	
Loss ...	130 11 2	Repair of implements ...	27 2 0	
Total ...	1,252 9 1	Wages for cultivation ...	341 15 9½	
		Wages for maintenance ...	419 8 11½	
		Petty construction and repair.	25 8 6	
		Rent, Rates and Taxes ...	182 5 3	
		Miscellaneous ...	52 11 0	
		Total ...	1,286 0 3	
		Add—		
		Cost of Castor Cake purchased in 1916-17.	35 3 0	
		Total ...	1,321 3 3	
		Deduct—		
		Cost of *Kalamdan* Paddy and *Indrasail* paddy seeds and Sugarcane sets in the year 1918-19.	27 6 0	
		Labour for cultivation of sugarcane for 1918-19.	41 4 2	
		Total ...	68 10 2	1,252 9 1

J. ROBINSON,
Deputy Director of Agriculture, Patna.

Annual Report of the Bankipore Agricultural Station for the year 1917-18.

The Bankipore Agricultural Experimental Station was established in 1906. The Farm is situated in latitude 25° 37″ north and longitude 85° 14″ east on land just south of the Bankipore Railway Station of the East Indian Railway and comprises about 210 acres of which about 170 acres are under cultivation, almost the whole being rice land ; the remainder is occupied by roads, buildings, orchard, etc.

The soil is a heavy, almost black, clay. The following table gives the chemical analysis of the soil made by Mr. Taylor, the Agricultural Chemist to the Government of Bihar and Orissa :—

Particulars.	North of Distributary.		South of Distributary.	
	Surface soil per cent.	Sub-soil per cent.	Surface soil per cent.	Suboil per cent.
1	2	3	4	5
Insoluble matter	76·96	73·84	75·60	73·85
Potash	·82	·82	·80	·83
Soda	·82	·82	·50	·52
Lime	1·89	1·65	·82	1·32
Magnesia	1·38	1·96	·73	1·17
Iron Aluminium	14·46	17·06	17·24	18·32
Phosphorus Pentoxide	·25	·30	17	·13
Sulphur Trioxide	Trace ...	Trace ...	Trace ...	Trace.
Carbon Dioxide	Trace ...	Trace ...	Trace ...	Trace.
Combined moisture and organic matter * ...	3·42	3·55	4·23	3·36
Total ...	100·00	100·00	100·00	100·00
* Containing nitrogen	·07	·055	·065	·043

The Farm which had hitherto been irrigated by the Patna Distributary of the Khagole Branch of the Sone Canals has since the winter of 1917 received no irrgation as the passage of canal water to the Farm is said to affect the salubrity of the New Capital.

The Distributary to the Farm has therefore been closed.

The total cost of the Farm for the financial year ending 31st March, 1918, was Rs. 10,661-15-4 and the total amount deposited into the Treasury during the year was Rs. 7,151-10-4.

Certain deductions may be made from this total in order to arrive at the approximate cost of the cultivation and up-keep of the Station. These are detailed below :—

	Rs.	A.	P.	Rs.	A.	P.
Total cost of the experimental station for the year 1917-18 ...				10,661	15	4
Deduct—						
1. Pay and Travelling Allowance of Superintendent, Overseers and Office peons.	2,740	6	10			
2. Postage and telegram charges, furniture Office expenses, hot-weather charges and Municipal Tax.	340	1	3			
3. Laying out	420	14	5			
4. Cost of bullocks and implements	1,102	10	6			
5. Branding and treatment charges of bullocks ...	49	1	9			
6. Petty construction and repairs (wages and materia's).	107	1	5			
	4,760	4	2	4,760	4	2
Total cultivation cost ...				5,901	11	2

Total deposited into the Treasury during the year 1917-18.			7,151 10 4
Add—			
	Rs. a. p.		
Stock in hand on 31st March 1918	2,375 8 9		
Bills due on 31st March 1918	1,699 6 9		
	4,074 15 6	4,074 15 6	
Total Receipts ...		...	11,226 9 10
Deduct—			
	Rs. a. p.		
Stock in hand on 1st April 1917	2,282 2 1		
Bills due on 1st April 1917	203 13 11		
	2,486 0 0	2,486 0 0	
Nett Receipts ...		...	8,740 9 10
Profit ...		...	2,838 14 8

If the above calculations are allowed a profit of Rs. 2,838-14-8 is shown as against a profit of Rs. 1,405-12-9 during the year 1916-17.

Character of the Season.

The following table gives the number of days on which rain fell and the total rainfall in inches, for each month during the year, together with average for ten years :—

Month.	1917-18.		Average for ten years.	
	Number of rainy days.	Rainfall in inches.	Number of rainy days.	Rainfall in inches.
1	2	3	4	5
April	Nil	Nil	1·11	·27
May	5	4·07	2·44	1·27
June	11	6·83	11·88	9·76
July	15	15·71	16·66	9·36
August	15	11·53	17·11	13·78
September	14	7·35	12·22	8·86
October	5	2·30	4·77	2·47
November	Nil	Nil	0·77	0·65
December	Nil	Nil	0·44	0 09
January	Nil	Nil	0·66	0·15
February	Nil	Nil	1·55	0·76
March	1	0·25	1·33	0·43
Total ...	66	47·34	70 94	47.85

The year under report was extremely favourable to the paddy crop but the tolal absence of rain from November to February affected adversely the outturn of *Rabi*. The heavy floods during August did but insignificant damage to the Farm paddy which had by that time well established itself, although transplanted paddy adjacent to the Farm suffered from a series of floods.

Outturn.

The following are comparative statistics of outturn of paddy and *Rabli* respectively for the past four years :—

Year.	Paddy.	Rabi.
1914-15	111,356 lbs.	... 72,652 lbs.
1915-16	106,685 „	... 64,944 „
1916-17	182,696 „	... 100,204 „
1917-18	201,310 „	... 96,186 „

RICE—*ORYZA SATIVA.*

I—Variety Experiments.

Farm-yard manure applied at the rate of 4,100 lbs. per acre.

Variety	Outturn per acre in pounds.		Profit (+) or loss (—) in rupees per acre.
	Grain.	Straw.	
1	2	3	4
	lbs.	lbs.	Rs. a. p.
Baitarni Paddy	1,919	3,703	+34 1 5
Bairanti „	1,557	3,023	+21 10 1
Gajpatta „	1,752	3,409	+28 10 4
Kartika „	1,933	3,730	+33 2 4
Laldaya „	1,384	2,770	+15 15 5
Shamjira „	1,491	2,894	+26 3 5
Kanakjira „	1,312	2,564	+19 5 4
Selha „	1,433	2,721	+15 11 5
Sirhanti „	1,758	3,428	+26 1 5

All the above are Aghani paddy except Kartika which is harvested in October or November. Baitarni is a fairly coarse paddy, Laldaya a medium, Bairanti, Gajpatta, Selha and Sirhanti are coarse varieties. These experiments were carried out in triplicate, on $\frac{1}{4}$th acre plots.

Kartika paddy although it has given the highest outturn both in grain and straw commands a market value lower than any one of the Aghani paddy.

Baitarni paddy which comes next to Kartika in yield has proved to be the most successful from an economic point of view.

RICE—*ORYZA SATIVA.*

II.—Seedling Experiments.

Farm-yard manure applied at the rate of 4,100 lbs. per acre.

Method of transplanting.	Outturn per acre, in pounds.		Profit (+) or loss (—) in rupees per acre.
	Grain.	Straw.	
1	2	3	4
	Lbs.	Lbs.	Rs. a. p.
2 Seedlings per hole	1,449	2,869	+19 10 8
4 Ditto	1,539	3,152	+18 9 0
8 Ditto	1,539	2,990	+12 9 4

The experiments were carried out in triplicate, the plots were of the $\frac{1}{4}$th acre each. The variety transplanted was Sirhanti.

RICE—*ORYZA SATIVA.*

III.—Manurial Experiments.

Manure applied per acre as top dressing,	Outturn per acre, in pounds.		Profit (+) or loss (—) in rupees per acre.
	Grain.	Straw.	
1	2	3	4
	Lbs.	Lbs.	Rs. a. p.
410 lbs. Til Cake...	2,809	4,423	+61 10 10
410 „ Castor Cake	2,885	5,040	+63 12 0
82 „ Khari salt	2,875	4,680	+68 2 0

These trials were conducted for the first time on the Farm in order to ascertain the relative value of manures which are available locally and applied by cultivators to paddy.

Although no definite conclusion can be drawn from the first year's trials the result so far is in favour of application of Khari salt.

RICE—*ORYZA SATIVA.*

IV.—Plough Experiments.

Series A.

The object of this experiment was to compare the outturn of transplanted rice on plots cultivated with Punjab, Hindustan and Desi Ploughs respectively.

Treatment of the land (manure applied 4,100 lbs. of cowdung per acre).	Outturn per acre, in pounds.		Profit (+) or loss (—), in rupees, per acre.
	Grain.	Straw.	
1	2	3	4
	Lbs.	Lbs.	Rs. a. p.
Ploughed with Punjab plough ...	1,944	2,458	+32 8 0
Ditto Hindustan plough ...	1,502	1,929	+23 0 6
Ditto Desi plough	1,692	2,186	+26 13 7

These experiments were carried out on Baitarni Paddy (transplanted) on $\frac{1}{5}$th acre plots, in duplicate series, in order to ascertain to what extent, if any, the yield of paddy is effected by deep, medium and shallow ploughings with the Punjab, Hindustan and Desi Ploughs, respectively.

The following table shows the result of gram broadcasted in the same plots :—

IV.—SERIES A.

Treatment of the land. Ploughing and manuring carried out on paddy.	Outturn per acre, in pounds.		Profit (+) or loss (—) in rupees, per acre.
	Grain.	Straw.	
1	2	3	4
	Lbs.	Lbs.	Rs. a. p.
Ploughed with Punjab plough... ...	453	482	+10 15 10
Ditto Hindustan plough ...	450	411	+5 9 2
Ditto Desi plough	525	447	+8 11 9

This is the 1st year of the experiment and the result so far is in favour of Punjab plough.

RICE.—*ORYZA SATIVA.*

IV.—PLOUGH EXPERIMENTS.

Series B.

Treatment of the land. (Manure applied 164 lbs. of Khari salt, per acre).	Outturn per acre, in pounds.		Profit (+) or loss (—) in rupees, per acre.
	Grain.	Straw.	
1	2	3	4
	Lbs.	Lbs.	Rs. a. p.
Ploughed with Punjab plough	1,857	2,854	+35 6 3
Ditto Hindustan plough ...	2 106	3,369	+45 0 5
Ditto Desi plough	2,237	3,574	+49 3 8

These experiments were carried out on $\frac{1}{5}$th acre plots in duplicate series, the variety transplanted was Baitarni.

IV.—Series B.

The following table shows the result of gram broadcasted on the same plots :—

Treatment of land. (Ploughing and manuring carried out on paddy.)	Outturn per acre, in pound.		Profit (+) or loss (—), in rupees, per acre.
	Grain.	Straw.	
1	2	3	4
	Lbs.	Lbs.	Rs. a. p.
Ploughed with Punjab plough... ...	862	746	+26 7 7
Ditto Hindustan plough ...	633	591	+19 7 1
Ditto Desi plough	694	645	+21 13 2

RICE.—*ORYZA SATIVA.*

IV.—PLOUGH EXPERIMENTS.

Series C.

Treatment of the land. Green manuring with Dhaincha (Sesbania aculeata.)	Outturn per acre, in pounds.		Profit (+) or loss (—) in rupees, per acre.
	Grain.	Straw.	
1	2	3	4
	lbs.	lbs.	Rs. a. p.
Ploughed with Punjab plough ...	1,795	2,829	+27 12 9
Ditto Hindustan plough ...	1,635	2,597	+28 3 5
Ditto Desi plough	1,707	2,751	+29 3 6

These experiments were carried out on $\frac{1}{5}$th acre plots, in duplicate series. The variety transplanted was Baitarni.

IV.—Series C.

The following table shows the result of gram broadcasted on the same plots :—

Treatment of land. (Ploughing and manuring carried out on paddy.)	Outturn per acre, in pounds.		Profit (+) or loss (—) in rupees, per acre.
	Grain.	Straw.	
1	2	3	4
	lbs.	lbs.	Rs. a. p.
Ploughed with Punjab plough ...	915	885	+30 12 4
Ditto Hindustan plough ...	987	939	+33 9 4
Ditto Desi plough	936	900	+31 8 10

This is the first year of the experiment and the result is in favour of the Hindustan plough.

RICE.—*ORYZA SATIVA.*

V.—CULTIVATION EXPERIMENTS.

Series A.

In accordance with the general practice of this district, that is, the broadcasting of leguminous Rabi Crop (Paira) in standing paddy, a series of experiments were again conducted, this year, for finding whether the rice and Paira crops are benefited by hot weather cultivation, if so, to what extent.

Treatment of the land. (Lands ploughed during hot weather).	Outturn per acre, in pounds.		Profit (+) or loss (—) in rupees, per acre.
	Grain.	Straw.	
1	2	3	4
	lbs.	lbs.	Rs. a. p.
Ploughed with Punjab plough... ...	1,461	1,656	+19 10 2
Ditto Hindustan plough ...	1,337	1,615	+14 6 10
Ditto Desi plough	1,162	1,368	+5 5 10
Unploughed	1,049	1,543	+11 3 2

These experiments were carried out on $\frac{1}{10}$th acre plots. The variety transplanted was Kalamdan.

V—Series A.

The following table shows the result of gram broadcasted on the same plots :—

Treatment of the land. (Ploughing and manuring carried out on paddy).	Outturn per acre, in pounds.		Profit (+) or loss (—) in rupees, per acre.
	Grain.	Straw.	
1	2	3	4
	lbs.	lbs.	Rs. a. p.
Ploughed with Punjab plough... ...	597	411	+10 6 8
Ditto. Hindustan plough ...	761	514	+16 10 8
Ditto. Desi plough	1,193	1,029	+36 0 8
Unploughed	802	617	+18 8 8

RICE.—*ORYZA SATIVA.*

V.—Cultivation Experiments.

Series B.

Treatment of the land.	Outturn per acre, in pounds.		Profit (+) or loss (—) in rupees, per acre.
	Grain.	Straw.	
1	2	3	4
	lbs.	lbs.	Rs. a. p.
Ploughed with the Punjab plough, in hot weather, green manuring with Sanai (Crotolaria juncea).	1,399	2,021	+17 12 2
Ploughed with the Punjab plough, in hot weather, green manuring with Sanai (Crotolaria juncea), 164 lbs. Khari salt as top-dressing per acre.	1,893	1,965	+25 0 10
Unploughed in hot weather, green manuring with Sanai (Crotolaria juncea), 164 lbs. Khari salt as top-dressing per acre.	2,160	2,391	+35 8. 4
Unploughed in hot weather, green manuring with Sanai (Crotolaria juncea).	1,651	2,042	+24 10 7

These experiments were carried out on $\frac{1}{5}$th acre plots The variety transplanted was Kalamdan, a local medium paddy. The unploughed plot with Khari salt has again this year given the highest profit.

Hot weather cultivation has had but little effect on the crop.

V.—Series B.

The following table shows the result of gram broadcasted on the same plots. The experiments were carried out on $\frac{1}{5}$th acre plots. The results have been shown per acre :—

Treatment of the land. (Ploughing and manuring carried out on paddy).	Outturn per acre, in pounds		Profit(+) or loss (—)in rupees, per acre.
	Grain.	Straw.	
1	2	3	4
	lbs.	lbs.	Rs. a. p.
Ploughed with the Punjab plough in hot weather, green manuring with Sanai (Crotolaria juncea).	741	674	+20 3 4
Ploughed with the Punjab plough in hot weather, plus green manuring with Sanai (Crotolaria juncea). 164 lbs. Khari salt as top dressing per acre.	1,152	977	+36 6 6
Unploughed in hot weather, plus green manuring with Sanai (Crotolaria juncea,) 164 lbs. Khari salt as top dressing per acre.	854	720	+24 3 6
Unploughed in hot weather, but green manuring with Sanai (Crotolaria juncea.)	555	417	+1i 7 4

RICE.—*ORYZA SATIVA.*

V.—Cultivation Experiments.

Series C.

These experiments were carried out on $\frac{1}{4}$th acre plots, two of these were in triplicate, four in duplicate, and two in single plots. The variety transplanted was Baitarni.

Treatment of the land.	Outturn per acre, in pounds.		Profit (+) or loss (—) in rupees, per acre.
	Grain.	Straw.	
1	2	3	4
	lbs.	lbs.	Rs. a. p.
Dug out in hot weather, plus green manuring with Dhaincha (Sesbania aculeata) (single).	2,241	4,443	+33 1 8
No hot weather treatment but green manuring with Dhaincha (Sesbania aculeata) (duplicate).	1,491	2,909	+25 9 10
Dug out in hot weather, plus green manuring with Dhaincha (Sesbania aculeata), plus 164 lbs. Khari salt, per acre, as top dressing (duplicate).	2,479	4,863	+42 7 2
No hot weather treatment but green manuring with Dhaincha (Sesbania aculeata), plus 164 lbs. Khari salt per acre, as top dressing (single).	2,444	4,773	+54 6 8
No hot weather treatment, but 164 lbs. Khari salt as top dressing per acre (duplicate).	2,000	3,105	+36 3 4
Dug out in hot weather (triplicate) ...	1,741	2,91	+17 10 6
Dug out in hot weather, plus 164 lbs. Khari salt, per acre, as top dressing (duplicate).	1,808	3,481	+17 5 0
No hot weather treatment (duplicate).	2,041	3,983	+30 1 1

In the above series also, hot weather digging does not appear to have benefited the main crop—Paddy.

V.—Series C.

The following table shows the result of gram and linseed broadcasted in the same plots. The experiments were carried out on one-fourth acre plots:—

Treatment of he land. (Ploughing and manuring carried out on paddy.	Outturn per acre, in pounds.		Profit (+) or loss (—) in rupees, per acre.
	Grain.	Straw.	
1	2	3	4
	lbs.	lbs.	Rs. a. p.
Dug out in hot weather, plus green manuring with Dhaincha (Sesbania aculeata) (single).	638	617	+21 1 0
No hot weather treatment, but green manuring with Dhaincha (Sesbania aculeata (duplicate).	507	455	+13 15 0
Dug out in hot weather, plus green manuring with Dhaincha (Sesbania aculeata), plus 164 lbs. Khari salt per acre as top dressing (duplicat).	671	648	+23 5 6
No hot weather treatment, but green manuring with Dhaincha (Sesbania aculeata), plus 164 lbs. Khari salt per acre as top dressing (single).	523	494	+16 2 0
No hot weather treatment, but 164 lbs. Khari salt as top dressing per acre (triplicate).	550	507	+16 0 3
Dug out in hot weather (triplicate). ...	590	564	+19 0 3
Dug out in hot weather plus 164 lbs. Khari salt per acre as top dressing (duplicate).	673	617	+22 7 0
No hot weather treatment (duplicate) ...	600	576	+18 11 0

Digging in the hot weather appears to have done good to the Paira crop following the paddy.

RICE.—*ORYZA SATIVA.*

V—Cultivation Experiments.

Series D.

The following table shows the result of experiments. These experiments were carried out on $\frac{1}{5}$th acre plots. The Baitarni paddy was broadcasted in the last week of June :—

Treatment of the land.	Outturn per acre, in pounds.		Profit (+) or loss (—) in rupees, per acre.
	Grain.	Straw.	
1	2	3	4
	lbs.	lbs.	Rs. a. p.
Dug out in hot weather	688	951	+1 11 11
Unmanured	743	913	+4 11 5
164 lbs. common salt applied as top dressing per acre.	944	1,139	+0 12 1
Unmanured	715	872	+3 12 5
164 lbs. Magnesium sulphate applied as top dressing per acre.	841	1,229	—10 14 2
164 lbs. Khari salt as top dressing per acre	1,090	1,224	+10 2 1
Unmanured	576	792	+0 4 2

Digging out during the hot weather does not appear to have been of any value to the main crop—broadcasted paddy.

V—*Series D.*

The following table shows the result of gram broadcasted in the same plots.

The manures were applied on the paddy crop.

Treatment of the land (ploughing and manuring carried out on paddy).	Outturn per acre, in pounds.		Profit (+) or loss (−) in rupees, per acre.
	Grain.	Straw.	
1	2	3	4
	lbs.	lbs.	Rs. a. p.
Dug out in hot weather	638	468	+14 9 4
Unmanured	669	519	+16 2 4
164 lbs. common salt applied as top dressing per acre.	699	617	+18 4 6
Unmanured	576	720	+15 12 6
164 lbs. Magnesium sulphate applied as top dressing per acre.	638	468	+14 9 4
164 lbs. Khari salt as top dressing per acre	1,090	926	+33 14 6
Unmanured	638	463	+14 8 6

Statement showing the classification of charges under experimental and non-experimental works carried out on the Bankipore Farm during the year 1917-18.

Experimental area (20 acres).	Amount.	Non-experimental area (145·65 acres).
1	2	3
	Rs. a. p.	Rs. a. p.
Seeds	5 6 3	35 14 9
Manures	52 0 3	246 9 9
Labour	631 7 0	4,172 6 4
Feed of cattle	33 4 0	241 1 3
Maintenance and Miscellaneous	64 4 7	466 1 11
Total ...	786 6 1	5,162 2 0
Receipts ...	1,441 10 9	8,956 6 3
Profit ...	655 4 8	3,794 4 3
Total Profit ...	.....	4,449 8 11

N. B.—In calculating the profit of Experimental and Non-experimental works carried out on the Farm the value of bye-products (straw, etc.) as existing at the time of storage has also been included.

Statement showing the receipts and expenditure of the Bankipore Farm for the year ending 30th June 1918.

RECEIPTS.				EXPENDITURE.					
Particulars.	Amount.			Particulars.	Amount.			Total.		
1	2			3	4			5		
	Rs.	a.	p.	I.—NON-RECURRING CONTINGENT EXPENDITURE.	Rs.	a.	p.	Rs.	a.	p.
1. Sale-proceeds of Farm produce.	6,737	7	5	1. Purchase of cattle	952	12	0			
2. Miscellaneous receipts.	104	4	6	2. Purchase of implements.	222	7	6			
3. Sale of old stores	128	8	0	3. Petty construction and repairs (wages and materials).	108	5	5			
4. Value of produce in hand on 30th June 1918.	1,856	7	0	4. Railway freight.	35	1	0			
5. Amount of bills outstanding on 30th June 1918	2,163	4	3	5. Laying out ...	398	0	6			
Gross receipts	10,989	15	2					1,716	10	5
Deduct—				II.—RECURRING CONTINGENT EXPENDITURE.						
Value of the stock in hand on 30th June 1917, Rs. 2,261-3-4				(*a*) *Office expenses*—						
Amount of bills outstanding on 30th June 1917. Rs. 144-12-3				1. Service postage stamps.	42	6	0			
				2. Hot weather charges.	10	1	3			
				3. Office expenses	6	7	0			
Total ...	2,405	15	7	4. Municipal Tax	7	2	0			
Net receipt ...	8,583	15	7	5. Purchase of furniture.	289	0	0			
				(*b*) *Establishment charges*—				355	0	3
				Pay and Travelling Allowance of Superintendent, Overseers, Clerk, Office Peon and Chaukidars.	2,809	15	1			
								2,809	15	1
				(*c*) *Cultivation* —						
				1. Feed of cattle...	274	5	3			
				2. Purchase of seeds	41	5	0			
				3. Purchase of manures.	240	1	0			
				4. Wages of labourers.	4,803	13	4			
				5. Miscellaneous contingencies (including cooly and cart hire).	530	6	6			
								5,889	15	1
				GRAND TOTAL ...	...			10,771	8	10

After deducting the nor-recurring contingent expenditure and recurring office and establishment expenditure, the total amount which can strictly be called cultivation charges is Rs. 5,889-15-1, so a profit of Rs. 2,694-0-6 is shown.

J. ROBINSON,

Deputy Director of Agriculture,

Patna Circle, Patna.

Annual Report of the Cuttack Agricultural Station for the Year 1917-18.

I. (*a*) *Site.*—The Cuttack Agricultural Experiment Station is situated some six miles from Cuttack town along the Taldanda Road, and in the villages of Bidyadharpur, Kanahipur and Bhadimul. The Farm receives its water-supply from the Taldanda Canal.

(*b*) *Area.*—During the month of May 1918, another 30 acres of high-land have been added to the Farm, thus bringing up the total area to 150 acres. Nearly 36 acres are occupied by tanks, roads, buildings, etc., and the remainder area is under cultivation. Major portion of the cultivated area is rice land.

II. *Soil.*—The predominant soil of the Farm is a light loam merging into sandy loam, and sand in high-lying plots. The following table gives an analysis of the Farm soils:—

Particulars.	Surface soil, first 9 inches per cent.	Sub-soil-second 9 inches per cent.
1	2	3
Insoluble silicates and sand	86·66	84·33
Ferrie Oxide	3·74	4·83
Alumina	5·52	·37
Lime	·30	·29
Magnesia	·59	·41
Potash	·24	·33
Soda	·03	·17
Phosphuric Acid	·03	·03
Sulphuric Acid	·01	·007
Carbonic Acid	·05	·06
Organic matter and combined water	2·83	3·07
Total	100·00	100 00
Containing Nitrogen	·004	·004

III. *Objects of the Station.*—(*a*) The solution of various problems involved in the cultivation of paddy, the most important crop of this Division.

(*b*) Study of all the varieties of paddy grown in Orissa Division.

(*c*) To ascertain the suitability and methods of cultivation of other important crops, e.g., sugarcane, jute, groundnuts, leguminous crops, and cereals.

(*d*) The supply of recommended seeds, manures and implements to cultivators and others.

(*e*) The demonstration of modrn implements of husbandry and improved methods of cultivation.

To render every assistance to private individuals, Farms, Co-operative Societies and others in the dissemination of improved methods of Agriculture.

IV. *Season.*—The rainfall during the year under report was above the normal. Complete absence of rain during December, January and February did some damage to the rabi crops, while the heavy rainfall in October affected the outturn of winter rice crop considerably.

Table below gives the rainfall of the year under report:—

Months.	Average of ten years including 1917-18	Number of Rainy days.	1917-18.
	Rainfall in inches		Rainfall, in inches.
April 1917	1·87	3	1·34
May „	2·91	7	4·14
June „	9·70	15	12·19
July „	12·65	20	8·40
August „	14·54	19	13·68
September „	9·01	20	8·97
October „	5·47	18	15·03
November „	1·51	3	35
December „	·38	Nil	Nil
January 1918	·24	Nil	Nil
February „	·67	Nil	Nil
March „	·76	2	·64
Total ...	59·71	107	64·74

SECTION I.

EXPERIMENTAL WORKS.

A.—Rice.

(a) *Manurial Experiment.*

(I) The object of the following experiments was to compare the effects of various heavy manures for irrigated transplanted rice. The experiments were carried out in duplicate on $\frac{1}{5}$th acre plots, the variety transplanted being Hunda, a coarse local rice. The name "Khatto" is given to the dry powdered mixture of cowdung and ashes, which the cultivator applies to his lands, while "Cowdung" denotes that which is made in properly constructed covered pits on the Experimental Station, and which naturally is richer than the village manure. A great deal of error was introduced in the experiment this year owing to the mistake on the part of the farm staff in draining out water from the manured plots through the control plots. This has naturally increased the outturn of the control plots, and the results obtained cannot be relied upon.

The table below shows the results obtained this year as compared with last year :—

Manure per acre.	Outturn in lbs. per acre. 1916-17 Grain.	Straw.	Outturn in lbs. per acre. 1917-18. Grain.	Staw.	Cost of cultivation per acre.	Value of yield per acre.	Profit.
1	2		3		4	5	6
					Rs. a. p.	Rs. a. p.	Rs. a. p.
Unmanured ...	1,368	2,808	1,872	2,512	21 5 0	53 4 11	31 15 11
Khato 4,510 lbs. ...	1,424	2,690	1,800	2,368	25 7 8½	51 4 6¼	25 12 9¾
Cowding 4,510 lbs....	1,470	2,716	1,804	2,365	24 5 3	52 2 2	27 8 5
Dhaincha Green Manure. ...	1,563	3,063	1,807	2,998	24 7 7	55 14 11	31 7 4

(II) The object of the following experiment was to find out a method for green-manuring broadcasted rice-field with Dhaincha. Almost the whole of rice crop of this Division is broadcasted and the only successful method of green manuring rice fields known to this station involves the more laborious but at the same time more paying system of transplanting rice. This last forms a real obstacle in the way of introducing the green-manuring operation in this Division as the people are backward and do not like to spend the extra labour required in transplanting rice. In order, therefore, to find a suitable method of green-manuring the broadcasted fields the following plan is adopted. Dhaincha seed at the rate of 10 lbs. to the acre is mixed with the necessary quantity of seed paddy and broadcasted in the fields. The Dhaincha plants along with rice are allowed to grow for about a month, when the former are ploughed and buried in the soil at the time of weeding the broadcasted crop. The ploughing up of Dhaincha plants is made possible through the unique system of "Beushan" prevalent in this Division. By this system broadcasted fields of rice are ploughed and cross-ploughed in the month of July. This operation helps to thin the growing crop and stir up the soil a little. The plough is passed through the land and most of the Dhaincha plants are uprooted. These and also those few which are not uprooted are buried in the soil when the field is weeded, which operation follows the "beushaning" of the land immediately. The table below gives the average results for the past two years and those obtained during the year under report :—

Manure.	Outturn in pound per acre. Average of 2 years. 1915-16 and 1916-17. Grain.	Straw.	1917-18. Grain.	Straw.	Cost of cultivation per acre.	Value of yield per acre.	Profit.
1	2	3	4	5	6	7	8
					Re. a. p.	Rs a. p.	Fs. a. p.
Dhaincha Green manure.	1,771	2,414	1,589	2,614	24 9 9	43 1 5	18 7 8
Unmanured ...	1,516	2,132	1,335	2,716	23 14 5	36 8 7	12 10 2

(III) *Effect of lime on Dhaincha green-manured fields.*—The results given in the following table are not in favour of lime. This is due to the high price of quick-lime. Although the outturn of grain from limed plots was more than

those which received no lime, the net profit is still in favour of the latter plots :—

Manure.	Outturn in pound per acre.				Cost of cultivation per acre.	Value of yield per acre.	Profit.
	Average of 2 years 1915-17.		1917-18.				
	Grain.	Straw.	Grain.	Straw.			
1	2	3	4	5	6	7	8
					Rs. a. p.	Rs. a. p.	Rs. a. p.
Dhaincha ageen Manure	2,317	3,344	2,239	3,280	24 5 2	62 11 11	38 6 9
Lime 1,230 lbs. per acre on Dhaincha Green manure.	2,314	3,267	2,204	3,229	29 14 2	61 13 5	31 15 3

(IV) Residual effects of Dhaincha green-manure on rice lands.—This series of experiments was started during the year under report, the object being to ascertain the duration of time necessary for repeating the application of Dhaincha green-manure to winter rice lands. The experiment was conducted in duplicate on $\frac{1}{5}$th acre plots and the variety used was Badshabhog, a fine Bengal rice. The results of the experiment are tabulated below. As the experiment is in its first year, all the plots except the control plots had to be green-manured :—

Manure.	Outturn in pound per acre.		Cost of cultivation per acre.	Value of yield per acre.	Profit.
	1917-18.				
	Grain.	Straw.			
1	2	3	4	5	6
			Rs. a. p.	Rs. a. p.	Rs. a.
Dhaincha every year	1,812	3,125	29 15 8¼	79 1 6½	49 1 10
Dhainchia after every alternate years	1,921	3,075	29 10 0	82 14 10½	53 4 10½
Dhaincha after every two yesrs ...	1,896	3,382	27 13 3⅛	83 2 8¾	55 5 5⅝
Unmanured	1,492	2,306	2 412 6¾	64 2 9¼	39 6 2½

(b) Variety Trials.

I. Three varieties of autumn (or "Aus") paddy were tried for comparative yield. The trial was conducted by broadcasted method and the table below shows the results obtained during the current year :—

Variety.	Outturn in pound per acre.				Cost of cultivation per acre.	Value of yield per acre.	Profit.
	1916-17.		1917-18.				
	Grain.	Straw.	Grain.	Straw.			
1	2	3	4	5	6	7	8
					Rs. a. p.	Rs. a. p.	Rs. a. p.
Tulsiful (coarse) ...	1,135	2,460	1,022	5,996	27 8 5	36 1 11	8 9 6
Benibhog (medium,)	1,165	2,745	784	5.914	28 7 2½	31 1 11	2 10 8½
C. P. Aus (fine) ...	1,127	3,175	579	3,331	25 11 8	27 8 10	1 13 2

(c) *Seedling Experiment*

I. An experiment to demonstrate the advantages of transplanting 2 or 3 seedlings, 9 or 10 inches apart as against the common method of transplanting 10 or 12 seedlings, 5 or 6 inches apart, in irrigated tracts and when fields are transplanted in the beginning of the season was again repeated this year. The following table gives the results obtained. It will be noted that though the outturn of produce is in favour of the local method the net gain is in favour of the recommended method. This is due to the great saving in the amount of seedlings used as well as less labour involved in the work :—

Method of cultivation.	Outturn in pound per acre.				Cost of cultivation per acre.	Value of yield per acre.	Profit.
	1916-17.		1917-18.				
	Grain.	Straw.	Grain.	Straw.			
1	2	3	4	5	6	7	8
					Rs. a. p.	Rs. a. p.	Rs. a. p.
Farm method ...	1,409	4,166	1,722	3,536	25 10 8	78 0 1	52 5 5
Local method ...	1,523	3,766	1,835	3,690	35 7 1	81 2 11	45 11 10

(d) *Experiment on the various methods of treating paddy seed-bed.*

I. *Manurial.*—Paddy seed-bed was treated with farm yard manure, village cowdung, and mixture of the above with oil-cake. The results are given in the following table. The experiment was conducted in duplicate on $\frac{1}{5}$th acre plots and the same number of seedlings were transplanted in each plot :—

Manures applied per acre in Seed-Bed.	Outturn in pound per acre.				Cost of cultivation per acre.	Value of yield per acre.	Profit.
	1916-17.		1917-18.				
	Grain.	Straw.	Grain.	Straw.			
1	2	3	4	5	6	7	8
					Rs. a. p	Rs. a. p.	Rs. a. p.
Khatoo on Seed-bed	1,581	2,024	1,286	2,306	25 3 3	35 4 10	10 1 7
Cowdung on Seed-bed 12,300 lbs,	1,810	1,947	1,338	2,280	24 14 10	36 8 3	11 9 4
Cowdung 12,300 lbs, and Oilcake 410 lbs.	1,660	2,029	1,243	2,293	24 10 7	34 2 10	9 8 3
Khatoo 12,300 lbs, and Oil cake 410 lbs.	1,704	1,998	1,225	2,203	24 9 8	33 12 9	9 3 1

II. The common seed-rate for seed-beds in this circle is 410 lbs. (5 mauuds of 82 lbs.) and upwards. The object of this experiment is to find out if this rate cannot be reduced economically. The test was conducted in triplicate on $\frac{1}{5}$th acre plots, and the same number of seedlings were transplanted in every series. The table below gives average results obtained this year.

Seeds sown per acre in seed-bed.	Outturn in pounds per acre.				Cost of cultivation per acre.	Value of yield per acre.	Profit.
	1916-17.		1917-18.				
	Grain.	Straw.	Grain.	Straw.			
1	2	3	4	5	6	7	8
					Rs. a. p.	Rs. a. p.	Rs. a. p.
246 lbs. seeds ...	1,547	1,947	1,360	2,532	22 0 1	39 6 0	17 5 11
328 lbs. seeds ...	1,886	2,306	1,309	2,460	22 2 8	39 6 4½	17 3 8½
410 lbs. seeds ...	1,845	1,742	1,555	2,460	22 1 1½	45 6 8	23 5 6½

III.—There are two common methods of sowing seed in seed-beds:

(1) Dry sowing, i.e., ordinary seed is broadcasted in lands as soon as these are ready ; and (2) wet-sowing, i.e., the seed-bed is puddled, the seed is made to sprout first and then sown in the puddled field. The object of this experiment is to find out which is the better of the two methods. The table below gives average results of duplicate plots :—

Method of Sowing.	Outturn in pounds per acre.				Cost of cultivation per acre.	Value of yield per acre.	Profit.
	1916-17.		1917-18.				
	Grain.	Straw.	Grain.	Straw.			
1	2	3	4	5	6	7	8
					Rs. a. p.	Rs. a. p.	Rs. a. p.
Wet sowing ...	1,711	3,162	1,835	3,357	24 3 11	77 5 10	53 1 11
Dry sowing ...	1,701	3,049	1,507	3,229	25 15 7	71 8 7	45 9 0

IV.—The seedlings are usually transplanted when about six weeks old. The following experiment was conducted to ascertain the proper age of seedlings for transplanting. The test was conducted in duplicate one-tenth acre plots and the results given here are averages of these.

Age of seedlings.	Outturn in pounds per acre.				Cost of cultivation per acre.	Value of yield per acre.	Profit.
	1916-17.		1917-18.				
	Grain.	Straw.	Grain.	Straw.			
1	2	3	4	5	6	7	8
					Rs. a. p.	Rs. a. p.	Rs. a. p.
20 days' old ...	994	2,121	979	1,845	20 4 0	32 14 6	12 10 6
30 days' old ...	920	1,588	1,317	2,306	21 11 11	53 3 6	31 7 7
40 days' old ...	1,045	2,121	1,465	2,716	22 7 6	59 10 10	37 3 4

(*e*) *Water requirements of broadcasted winter rice crop.*

The object of these experiments is to find out exactly what amount of water is necessary to grow a good average crop of broadcasted winter paddy. In the irrigated tracts of this Division the cultivators are always clamouring for water and still more water and during my inspections in these areas it appeared to me that they take far too much water than is really necessary for the growth of the crop.

As the rainfall during the year under report was above the normal and fairly well distributed no artificial irrigation was found necessary, while last year only one irrigation was given. The average results obtained from the duplicate plots are given in the following table :—

Quantity of water given per acre in addition to the rainfall during the year.	Outturn in pounds per acre.				Cost of cultivation per acre.	Value of yield per acre.	Profit.	Remarks.
	1916-17.		1917-18.					
	Grain.	Straw.	Grain.	Straw.				
1	2	3	4	5	6	7	8	9
					Rs. a. p.	Rs. a. p.	Rs. a. p.	
2 inches per acre	1,419	1,383	1,732	2,993	23 5 3	53 14 1	30 8 10	No irrigation was necessary during season 1917-18.
3 Ditto	1,271	1,563	1,711	2,825	23 4 4	53 4 0	29 15 8	
4 Ditto	1,250	1,486	1,635	2,665	23 5 1	50 1 10	26 12 9	
No artificial irrigation	1,069	1,409	1,768	2,767	23 6 5	53 11 11	30 5 6	

(*f*) *Cultivation Experiments.*

I. The object of these experiments is to compare the outturns of broadcasted with transplanted rice. The plots were not to be irrigated unless it was found absolutely necessary to do so. The experiment was carried out in duplicate on one-fifth acre plots, and the results given, in the table below, are the averages :—

Method of cultivation.	Outturn in pounds per acre.				Cost of cultivation per acre.	Value of yield per acre.	Profit.
	Average of last 2 years.		1917-18.				
	Grain.	Straw.	Grain.	Straw.			
1	2	3	4	5	6	7	8
					Rs. a. p.	Rs. a. p.	Rs. a. p.
Transplanting ...	1,709	1,975	1,571	2,255	22 14 11	41 9 6	18 10 9
Broadcasting ...	1,465	1,668	1,368	3,023	20 13 7	38 2 2	17 4 7

II. Effects of growing a leguminous crop and keeping the land fallow on the succeeding Aus (Autumn) paddy crop.

The following table gives averages of results of experiments carried out on one-fifth acre plots in duplicate. Field peas were used as the leguminous crop. It will be seen that the plots which had the pulse crop have given better results than those left fallow :—

Rotation in Aus paddy.	Outturn in pounds per acre.				Cost of cultivation per acre.	Value of yield per acre.	Profit.
	1916-17.		1917-18.				
	Grain.	Straw.	Grain.	Straw.			
1	2	3.	4	5	6	7	8
					Rs. a. p.	Rs. a. p.	Rs. a. p.
Aus paddy after pulse crop.	1,735	3,854	745	4,896	21 15 0	29 13 4	7 13 6
Aus paddy after fallow...	1,670	3,689	652	4,817	21 13 8	27 0 9	5 3 1

III. The object of this experiment is to compare the outturns of broad casted rice lands cultivated with Raja plough and country plough. The experiment was conducted on one-fifth acre plots and the average results obtained are tabulated below :—

Kind of plough.	Outturn in lbs. per acre. 1917-18.		Cost of cultivation per acre.	Value of yield per acre.	Profit.
	Grain.	Straw.			
1	2	3	4	5	6
			Rs. a. p.	Rs. a. p.	Rs. a. p
Local plough	1,711	3,331	26 12 2	56 3 10	29 7 8
Rajah plough	1,903	3,229	27 11 11	59 7 10	31 11 11

IV. "Beushan" Experiments.

This experiment was started during the year under report. The object aimed at is to find out whether the local practice of "Beushaning" (ploughing through) of broadcasted rice lands when the crop is about 9" to 1 foot high is essential. The local cultivators maintain that the local agricultural conditions necessitate this practice. In my opinion the real reason for the practice is to be found in the very heavy local seed rate for broadcasted winter rice (82 to 103 lbs., per acre) and the very poor cultivation given to the lands prior to seeding (2 to 4 ploughings). The crop when grown by the local method is very thick and soon takes on a deathly yellow appearance owing to very thick growth and poor preliminary cultivation. The cultivator then resorts to the drastic method of thinning out his crop wholesale by ploughing and cross-ploughing through the growing crop and then weeding it. This practice not only thins the crop but gives an extra cultivation to the land and the crop after this operation, locally called "Beushan," improves marvellously. If, therefore, the lands are cultivated thoroughly before seeding and a lower seed rate is adopted this 'beushaning' practice should not be necessary in order to obtain the same, if not better, outturns as obtained by the local methods. The results obtained this year, as shown in the following table, are very promising and will be continued for another 2 or 3 seasons before any conclusion is drawn. The experiment was conducted in duplicate on $\frac{1}{5}$th acre plots and the average results are shown here:—

Nature of operation.	Outturn in lbs. per acre, 1917-18.		Cost of cultivation per acre.	Value of yield per acre.	Profit and Loss.
	Grain.	Straw.			
1	2	3	4	5	6
			Rs. a. p.	Rs. a. p.	Rs. a. p.
Beushaned. Seed rate 71¼ lbs. Fields ploughed 5 times before sowing (Local) method.	1,650	4,047	24 13 5	48 13 1	23 15 8
Not beushaned. Seed rate 71¼ lbs. Fields ploughed 5 times before sowing.	1,455	4,405	30 8 11	45 7 11	14 15 0
Not beushaned. Seed rate 51 lbs. Fields ploughed 10 times before sowing.	1,778	5,227	31 9 1	55 3 10	23 10 9
Not beushaned. Seed rate 51 lbs. Fields ploughed 5 times before sowing.	1,537	3,946	28 2 1	46 0 0	17 13 11

(g) *Seed-rate.*

The object of this experiment is to find out the most economical seed-rate for broadcasted winter rice. The trial was conducted in duplicat on $\frac{1}{5}$th acre plots and the results obtained are tabulated below:—

Quantity of seeds sown per acre.	Outturn in lbs. per acre.				Cost of cultivation per acre.	Value of yield per acre.	Profit.
	1916-17.		1917-18.				
	Grain.	Straw.	Grain.	Straw.			
1	2	3	4	5	6	7	8
					Rs. a. p.	Rs. a. p.	Rs. a. p.
40 seers seeds	1,578	2,203	2,039	2,998	24 10 9	59 10 7	34 15 10
30 seers seeds	1,720	2,562	2,234	2,665	24 14 3	62 10 0	37 11 9
20 seers seeds	1,920	2,229	2,167	2,076	24 5 1	61 1 2	36 12 1

(*h*) *Seed-selection.*

Two methods were employed for selecting rice seed. First was by immersing seed in a saturated solution of salt (Japan method), and the second was by plant to plant selection at harvest time. The average results obtained from duplicate $\frac{1}{5}$th acre plots are given in the following tables. In the first case Khura paddy (a coarse variety) was used and in the second Benaphuli.

It will be seen from the results that the selected seed gave a higher outturn in each case as compared to the unselected seed.

(*a*) Seed selected by immersing it in a saturated solution of salt:—

Nature of selection.	Outturn in lbs per acre, 1917-18.		Cost of cultivation per acre.	Value of yield per acre.	Profit.
	Grain.	Straw.			
1	2	3	4	5	6
			Rs. a. p.	Rs. a. p.	Rs. a. p.
Saturating by salt water ...	1,537	3,024	19 2 5	43 3 3	24 0 10
Without saturating ...	1,292	2,152	18 5 9	35 1 8	16 11 11

(*b*) *Plant to plant selected seed*

Treatment.	Outturn in lbs. per acre, 1917-18.		Cost of cultivation per acre,	Value of yield per acre,	Profit.
	Grain.	Straw.			
1	2	3	4	5	6
			Rs. a. p.	Rs. a. p.	Rs. a. p.
Selected seed	1,573	3,024	18 13 4	43 15 5	25 2 1
Unselected seed	1,348	2,921	18 12 4	38 11 2	19 14 10

B.—Groundnut.

I. Varietal tests on groundnuts were continued during the year under report. There were six varieties under trial and the results obtained on duplicate plots of $\frac{1}{20}$th acre each are tabulated below. The crop was badly damaged by crows and jackals and harvesting was rather expensive, hence the poor outturns.—

Variety.	Outturn in lbs. per acre, 1917-18.	Cost of cultivation, per acre.	Value of yield per acre.	Profit or loss.	—
1	2	3	4	5	6
		Rs. a. p.	Rs. a. p.	Rs. a. p.	
Virginia	1,102	100 5 7	80 10 0	19 11 7	Loss.
Mauritius	927	98 10 9	67 14 3	30 12 6	Do.
Big Japan	851	94 9 9	62 3 10	32 5 11	Do.
Pondicherry	1,107	98 7 0	81 0 3	17 6 9	Do.
Big erect	389	99 2 5	28 7 10	70 10 7	Do.
Spanish Peanut	465	105 9 4	34 2 0	71 7 4	Do.

II. Manurial tests.—Effect of lime, lime mixed with cowdung, cowdung alone, and canal silt was tested on groundnut crop in two series. The crop was very poor owing to considerable damage by Tika disease. The results are tabulated below :—

Series I.

Manures applied per acre.	Outturn in lbs. per acre. 1917-18.	Cost of cultivation per acre.	Value of yield per acre.	Profit or loss.	—
1	2	3	4	5	6
		Rs. a. p.	Rs. a. p.	Rs. a. p.	
No manure	409	85 0 3	26 15 8	58 11 7	Loss.
Canals silt 32,800 lbs.	420	83 5 3	30 11 8	55 9 7	Do.

Series II.

Manures applied per acre.	Outturn in lbs. per acre. 1917-18.	Cost of cultivation per acre.	Value of yield per acre.	Profit or loss.	—
1	2	3	4	5	6
		Rs. a. p.	Rs. a. p.	Rs. a. p.	
Lime 1,230 lbs. ...	615	91 9 10	45 0 0	46 9 10	Loss.
Lime 1,230 lbs. and Cowdung 16,400 lbs.	810	101 2 4	59 4 4	41 14 0	Do.
Cowdung 16,400 lbs. ...	810	89 8 6	59 3 11	30 4 7	Do.
No manure	677	83 11 2	69 8 1	34 3 1	Do.

C.—SUGARCANE.

I. Manurial tests.—The effect of various doses of cowdung and oil-cake on sugarcane crop were continued during the year. The experiment was conducted in duplicate on $\frac{1}{10}$th acre plots and the variety experimented upon was Mungo (a thin Behar cane). The results obtained are tabulated below :—

Manures applied per acre.	Outturn in lbs.	Per acre	Cost of cultivation per acre.	Value of yield per acre.	Profit.
	1916-17. Gur.	1916-17. Gur.			
1	2	3	4	5	6
			Rs. a. p.	Rs. a. p.	Rs. a. p.
Cowdung 12,300 lbs. ...	1,481	3,860	221 15 3	376 9 5	154 10 2
,, 12,300 lbs. and oil-cake 1,230 lbs.	2,926	4,500	253 9 11	439 4 9	185 10 10
Cowdung 20,500 lbs. ...	2,863	4,030	221 2 4	394 1 0	172 14 8
,, 20,500 lbs. and oil-cake 1,025 lbs.	4,009	4,620	253 1 7	451 9 0	198 7 5
Cowdung 28,700 lbs. ...	2,381	4,770	233 1 2	465 10 0	232 8 10
,, 28,700 lbs. and oil-cake 82 lbs.	3,508	4,860	252 11 10	474 6 0	214 10 2
,, 36,900 lbs. ...	3,084	,080	227 14 8	495 15 0	268 0 4
Oil-cake 2,050 lbs. ...	4,113	5,170	283 0 6	505 10 0	223 9 6

II. Cultivation trials.—Local method of cultivating sugarcane was tried against "Ridge and Furrow" method of planting. The average results obtained from duplicate $\frac{1}{10}$th acre plots are given in the following table :—

Method of cultivation.	Outturn in lbs. per acre, 1917-18. Gur.	Cost of cultivation per acre.	Value of yield per acre.	Profit.
1	2	3	4	5
		Rs. a. p.	Rs. a. p.	Rs. a. p.
Ridge and furrow system of planting ...	4,805	260 5 8	469 4 7	208 14 11
Flat planting	4,302	254 11 2	422 0 6	167 5 4

II.—Non-Experimental Area.

The non-experimental area of the Farm was put under paddy, jute, sugarcane, dhaincha, Hibiscus cannabinus, peas, kulthi, mung, pan, etc. The following table gives the results obtained from some of the more important crops. It may be noted here that one-half of the pan plantation was badly damaged by a heavy cyclone during the year 1916-17 and had to be completely renewed.

Name of crop.	Area in acres.	Cost of cultivation, per acre.	Value of yield, per acre.	Profit or loss.	—
1	2	3	4	5	6
		Rs. a. p.	Rs. a. p.	Rs. a. p.	
Paddy	29$\frac{1}{2}$	619 15 2$\frac{1}{2}$	999 14 2$\frac{1}{2}$	379 15 0	Profit.
Jute	1$\frac{9}{10}$	129 11 0	147 5 0	17 10 0	Do.
Sugarcane	1$\frac{4}{5}$	258 11 $\frac{1}{2}$	722 4 9$\frac{1}{2}$	463 9 9	Do.
Mung	14$\frac{1}{2}$	101 8 10	110 0 3	8 7 5	Do.
Pan	$\frac{1}{5}$	221 13 0	39 6 8	182 6 4	Loss.
Plantain garden	...	97 1 11	38 4 6	58 13 5	Do.

III.—Accounts.

The year under report was rather a poor one on the whole. The heavy rains of October decreased the outturn of paddy, our main source of income, considerably. The outturn of Jute was fair but prices were ridiculously low. Paddy and *gur* also were very cheap and hence the low income obtained from the farm produce during the year under report.

1. Statements showing expenditure and value of outturn from experimental and non-experimental areas of the Cuttack Agricultural Station for the year 1917-18 :—

A.—Experimental Area, 38·103 acres.

Receipts.	Rs. a. p.		*Expenditure.*	Rs. a. p.
Value of farm produce ...	2,133 12 0		(1) Purchase of seed ...	129 8 3
Credit value of r m manure. (Rs. a. p. 20 4 2)			(2) Water rates ...	71 11 4
			(3) Value of manures ...	124 7 2
			(4) Labour charges ...	990 3 3
			(5) Maintenance charges ...	549 8 2
			(6) Cattle food ...	189 7 6
Miscellaneous receipts 150 3 3	170 7 5		(7) Miscellaneous expenses	200 7 3
Total Receipts ...	2,304 3 5		Total Epxenditure ...	2,255 4 11

B.—Non-experimental area, 48·8 acres.

Receipts.				*Expenditure.*			
		Rs. a. p.				Rs. a. p.	
Value of farm produce ...		2,108 9 9		(1) Purchase of seed ...		142 6 3	
	Rs. a. p.			(2) Water rates ...		83 4 8	
Credit value of farm manure.	25 2 3			(3) Value of manures ...		114 2 3	
Miscellaneous receipts	185 1 3	210 3 6		(4) Labour charges ...		1,093 2 6	
				(5) Maintenance charges ...		560 9 0	
				(6) Cattle food ...		229 3 3	
				(7) Miscellaneous expenses		222 4 5	
Total Receipts ...		2,318 13 3		Total Expenditure ...		2,450 0 4	

N. B. In the above tables the value of Farm produce is based upon the market rates prevailing at the time of harvest.

2. *Statement showing actual receipts and expenditure of the Cuttack Agricultural Station for the year* 1917-18.

Assets.				Expenditure.			
		Rs. a. p.				Rs. a. p.	
Amount remitted to treasury.		3,229 15 10		Pay and Travelling allowance of saff.		2,384 5 1	
Stock in hand on 31st March 1918.		1,642 6 9		Office expenses, e.g., postage and telegram charges, hot weather charges, office expenses, repairs and purchase of furniture.		64 15 6	
Bills due on 31st March 1918.		350 1 0		Non-recurring contingent expenditure, e.g., cost of bullocks, laying out and purchase of implements.		1,084 4 7	
Gross receipts ...		5,222 7 7		Recurring contingent expenditure, e.g.— cost of cultivation, i.e. money actually spent on the up-keep of the station.		4,649 10 4	
	Rs. a. p.						
Stock in hand on 1st April 1917.	1,526 7 0						
Bills due on 1st April 1917.	322 10 3			Total ...		8,183 3 6	
Deduct Total ...		1,849 1 3			Rs. a. p.		
Net receipts ...		3,373 6 4		Pay and travelling allowance of staff.	2,384 5 1		
Loss ...		1,276 4 0		Office expenses	64 15 6		
				Non-recurring expenditure.	1,084 4 7		
				Deduct ...		3,533 9 2	
Total ...		4,649 10 4		Total ...		4,649 10 4	

IV.—Seed-supply.

The following statement shows the quantity of seeds supplied from the farm :—

Name of seeds, etc.	Quantity supplied in lbs. (82lbs. per maund.)
1. Badshabhog	2,187
2. Dadkhani	293
3. Khasagundi	140
4. C. P. Fine Aus	95
5. Balam paddy	43
6. Benibhog	134
7. Hunda	173
8. Khura	110
9. Kakaya Bombay Jute seed	46
10. Dhaincha	315
11. Groundnuts—	
(Spanish Peanut)	34
(Pondicherry)	280
(Mauritius)	404
(Big erect)	39
(Virginia)	32
(Big Japan)	29
12. Pea	31
13. Gram	4
14. Lentil	15
15. Sweet Juar	30
16. Plantain suckers (number)	52
17. Papaya seedling	60 seedlings.
18. Mungo seed canes	31,875 canes.

V.—Miscellaneous.

1. The study of local varieties of rice regarding their agricultural character was continued during the year under report. Some 225 varieties were grown in line culture and studied, and single ear selections were made during the year under report. The work is being continued.

2. Ten students were trained in practical agriculture on the farm during the year under report.

3. During the year under report the Farm was visited once by the Director of Agriculture, Bihar and Orissa, and once by the Agricultural Chemist to the Government of Bihar and Orissa.

The following officials also visited the Farm :—

1. The Commissioner, Orissa Division.
2. The Chief Engineer, Bihar and Orissa (Irrigation Branch).
3. The Superintending Engineer, Orissa Circle.
4. The Hon'ble Raja of Kanika.
5. The Officiating Professor of Agriculture, Sabour.
6. The Principal, Ravenshaw College, Cuttack, and various other gentlemen and landholders of this division.

VI.—Charge of the station.

The Farm was in charge of Babu Madan Mohan Pradhan up till the end of August 1917, when he was transferred as Inspector of Agriculture to Sambalpur District, and Babu Jagernath Dey took over the charge. This officer handed over the charge of the station in October 1917 to Babu E. L. Rout, who remained in charge of the station throughout the remainder part of the year. The Farm Superintendent is assisted in his work by two Overseers and one clerk. The work of the station was directed and supervised by me.

D. R. SETHI—31-8-1918.

Deputy Director of Agriculture, Orissa.

Annual Report of the working of the Ranchi Agricultural Station for the year ending 0th June 1918.

Introductory.

The Ranchi Farm was started in 1915 and an account of the local conditions is to be found in the first year's report.

Communications are bad in Chota Nagpur and the soil is very poor except in potash, and grows miserable crops, and *prima facie* the first problem was to find crops sufficiently valuable for export from out-of-the-way parts, to pay for the necessary imports of manure.

The first year's working showed that gypsum and bonemeal were almost ideal manures and suggested that ground-nuts would partly solve the crop problem.

But the combined rainfall of August, September and October 1915 was under 16 inches ; in 1916, with a rainfall of nearly 29 inches in the same period, the crop of ground-nuts was reduced by fungus disease from 2,000 to about 1,000 lbs., and in 1917, with a fall of over 52 inches in these three months, to about 300 lbs. per acre.

The application of purchased manures to a crop that is liable to such fluctuations is a speculation that cannot be recommended, and it has therefore become necessary to undertake more detailed investigations on ground-nuts and to try to find other crops that will stand wet seasons.

Experiments with cotton were begun in 1917 and those with soybeans were extended. The results of these experiments will be found below.

Another point brought out by the second year's working of the farm was the necessity of spreading the demand for labour more evenly over the year so as to provide more scope for work from December to May and to reduce the amount of labour required in June and July for sowing and weeding upland crops and transplanting paddy. A remedy suggests itself in the extension of cold weather crops, and more particularly of sugarcane which requires a very large amount of labour of men and bullocks for cutting, crushing, and planting in January, February, and March. Experiments in this direction are also reported below—

Buildings.—No additions were made to the farm buildings during the year. A large shed for implements and general purposes is required, but its erection must await the return of normal fiscal conditions.

Livestock.—Four young bullocks were bought for the farm at the Sonepur fair by the Superintendent of the Sepaya Farm, and have been trained. The livestock now consists of 11 pairs of working bullocks, a bull, 6 milch cows, four yearlings and three calves.

Milk to the value of Rs. 248 was sold during the year. The opening of the European Lunatic Asylum has provided an expanding market for milk and a larger number of cows could be kept with economy, but the limit of the present accommodation has been reached.

Implements.—Apart from wooden ploughs, etc., made locally the only implements bought during the year were Madras drills and hoes. The purchase of American hand hoes was again postponed owing to war conditions.

Laying Out.—The two tanks were deepened and the *bandhs* and adjoining fields raised, and a new small tank was made with a view to controlling the run off from the asylum land which formerly caused constant breaches of the farm *bandhs*.

Two masonry culverts have been built at a cost of Rs. 538 to carry farm roads over the channels leading to the large tank, and the road system has been extended so as to give access to every field on the farm for carts.

Three acres of first class paddy land (*garha don*) have been drained, for sugarcane, with local tiles, 24 feet apart, at 4 feet depth ; and 9 acres of very inferior upland have been partially levelled with a view to turning it into second and third class paddy land.

The greater part of this laying out was done by coolies of the Chota Nagpur labour corps pending their departure on military duty, and an extra grant of Rs. 894 was made to the farm to defray the cost of their employment.

Season.—Table I shows the rainfall from April 1917 to March 1918, recorded at the Kanke Agricultural Station.

TABLE I.

	1917.									1918.			
—	April.	May.	June.	July.	August.	September.	October.	November.	December.	January.	February.	March.	
1st week	Nil	0·78	1·99	3·06	10·12	3·54	9·88	Nil	Nil	Nil	Nil	Nil	
2nd „	Nil	1·42	3·41	2·66	5·97	1·71	Nil	Nil	Nil	Nil	Nil	Nil	
3rd „	0·03	0·82	4·91	2·37	2·11	5·51	1·63	Nil	Nil	0·20	Nil	0·08	
Remainder of month ...	Nil	0 27	1·74	4·71	3·51	2·80	5·30	Nil	Nil	0·01	0·12	0·14	Grand Total 80·93
Total ...	0·03	3·29	12·05	12·80	21·76	13·64	16·81	Nil	Nil	0·21	0·12	0·22	

About 20 acres of upland crops were sown before the monsoon began and made a very good start, but the subsequent heavy and continuous rain made weeding impossible and completely disappointed expectations. The subsoil water in fact rose to within a foot of the surface on the higest part of the farm early in August.

This seems to be a normal occurrence on many of the ridges in Chota Nagpur, and in Ranchi itself, where the water in many of the wells is at the ground level in wet weather at the end of the monsoon.

The season was, of course, an excellent one for paddy, and in spite of heavy floods comparatively little damage occurred to the farm crops owing to the regulating effect of the deep narrow outlets from the tanks.

Paddy transplating on the farm could not however be begun until the surrounding cultivators had finished their own, owing to want of labour, the difficulty noted last year being thus accentuated. The cultivators' method of meeting this difficulty by broad-casting half of his paddy in May will be investigated on the farm in the coming year.

General Cropping.

Table II shows the principal areas of crops grown with the yields and value.

TABLE II.

Name of crop.	Area in acres.	Yield per acre in lbs.	Value per 100 lbs.	Gross return per acre.	Remarks.
1	2	3	4	5	6
			Rs. a. p.	Rs. a. p.	
Groundnuts, Raipur, Local ...	3·35	240	6 4 0	15 0 0	Spreading varieties.
Do. Pondicherry ...	3·75	440	6 4 0	27 8 0	
Do. Small Japanese ...	4·25	113	6 4 0	7 1 0	Upright varieties.
Do. Spanish ...	6·16	266	6 4 0	16 10 0	
Do. Bombay erect ...	0·50	104	0 0 0	0 0 0	In low land.

TABLE II—*continued.*

Name of crop.	Area in acres.	Field per acre in lbs.	Value per 100 lbs.	Gross return per acre.	Remarks.
1	2	3	4	5	6
			Rs. a. p.	Rs. a. p.	
Ground nuts, Selected erect ...	0·50	140	0 0 0	0 0 0	In low land.
Cotton—4F. (Lyallpur) ...	7·00	11	50 0 0	5 8 0	
Lowland rice, Indrasail (Dacca)	9·50	2,720	2 8 0	68 0 0	
Do. Kalamdan ...	2·15	1,920	2 8 0	48 0 0	
Do. Nagra ...	2·10	2,040	2 8 0	51 0 0	
Do. Gurmatia (C. P. No. 19).	0·58	1,600	2 8 0	40 0 0	
Do. Badshahbheg ...	2·20	2,076	4 0 0	83 0 0	Small area of very good land.
Do. Dadkhani ...	10·00	1,900	4 0 0	78 0 0	
Soybeans, black	3·80	...	...	...	Turned into silage.
Do. Varieties ...	1·22	1,070	...	...	Unmarketable.
Maize	2·85	2?0	...	...	Crop destroyed by wind and rain.
Gangai (Jowar)	2·40	500	3 7 0	17 0 0	Part cut for silage.
Sunn-hemp	3·40	...	...	...	Fed to cattle.
Sorguja	8·28	...	...	...	Green-manure.
Wheat, Pusa No. 12 ...	1·50	1,200	5 4 0	63 0 0	
Do. Local white ...	2·70	811	5 4 0	42 9 0	
Do. Do. red	1·90	720	5 2 6	37 2 0	
Barley	5·00	530	2 14 0	15 4 0	After maize.
Oats	4·00	210	5 0 0	10 8 0	After Spanish, groundnuts.
Sarson	4·30	276	6 14 0	19 0 0	

Groundnut.—The area of groundnut was considerably reduced in view of their comparative failure in the previous year. The crop grew well to start with, but it was impossible to keep it clean owing to the incessant rain, and as the season progressed it became generally unhealthy and the greater part of the crop was completely rotten above ground before harvesting was possible. The Pondicherry variety however retained some of its leaves throughout, and eventually gave about twice the yield given by other varieties.

The nuts of this variety were also sounder than others.

Owing to the decay of the stalks it was not possible to harvest the Spanish and Japanese varieties properly by pulling up the plants, and a large number remained in the ground and could not be harvested subsequently with economy owing to the complete failure of winter rains.

The study of the liability of this crop to disease, as contrasted for instance with the healthiness of soybeans under similar conditions, is of great interest from many points of view. Experiments detailed below seem to exclude the possibility of its being due to any deficiency of minerals in the soil. The high subsoil water-level in the year under report offers a facile explanation, but the disease was exceedingly severe in September 1916 when the subsoil condition were good and the surface only was saturated by constant wet weather.

The Imperial Mycologist inspected the crop in September 1917 and identified several fungi as more in evidence than that which causes 'tikka'.

The general effect is very similar to the 'blight' of potatoes in Ireland which appears to be independent of everything but atmospheric conditions and the resisting capacity of individual plants and varieties. It is possible that in the case of groundnuts, which are grown annually from seed, a degree of acclimatisation to atmospheric conditions unfavourable to the present constitution of the great mass of the crop may be only a matter of time. A great variety of material is now growing on the farm and any possibilities in this direction should show themselves in a year or two.

Cotton.—The crop made a good start but it was impossible to weed it owing to excessive rain and it was grazed off.

Soybeans.—Four acres of soybeans were grown for silage. The crop did not apparently suffer from the high subsoil water-level, and gave a mass of green stuff which made very good silage in September, a crop of mustard being then grown on the same land.

A good yield of soybean seed was obtained on two acres of experimental plots and the crop will be used on the farm as a subject for monsoon experiments with mineral manures—being more reliable than groundnuts for this propose and having the great advantage that a succession of varieties is available for sowing in succession throughout the monsoon whenever weather conditions may be suitable.

Jowar (*Sorghum*) locally called *gangai*, sown in May 1917, gave a fair crop of fodder and some grain. It is remarkable that a sufficient number of plants survived cutting when the seed was nearly ripe to give a thick crop in the current season without resowing after an interval of six months without appreciable rainfall.

Sann hemp (*Crotalaria juncea*) was grown for early cattle fodder, the supply of straw being insufficient.

Sorguja (*Guizotia Abyssinica*).—Sorguja seed was sown broadcast on newly levelled land as a green manure for cold weather crops.

Rice.—The paddy crop was transplanted late owing to difficulty in getting labour while transplantation was in progress in the neighbourhood. The season was very favourable and the prolonged rain suited the three principal varieties grown, viz., Indrasail, Dadkhani, and Badshahbhog, which are from a fortnight to a month later than the latest local varieties. Harvesting, like sowing, had to defer to the convenience of local labour, and a good deal of Indrasail was shed. The advantage of later ripening varieties for the first class paddy land was thus prominently brought out, and Indrasail is being recommended for this purpose.

Wheat.—Pusa No. 12 and local wheats were grown on land on which late sown cotton had been smothered by weeds and grazed off; bonemeal had been applied for the cotton, and besides the grazing off of a luxuriant crop of grass, part of the land, including the whole of that under Pusa 12, was manured with farm yard manure in September. The manure was completely rotted by the time the rains stopped on November 1st, and the crop was sown on November 6th. The crop was therefore exceptionally good for Chota Nagpur in spite of the absence of appreciable rainfall during its growth.

The sample of Pusa 12 was mottled and soft, probably owing to excess of moisture in the subsoil at sowing time.

Oats.—Oats were sown after early groundnuts and in spite of abundant moisture made very poor growth owing obviously to deficiency of available nitrogen in the soil.

Barley.—Gave a fair yield after maize on land that had been manured with bonemeal. Its value is low and its chief merit—that of producing a crop when sown late—does not come into play when a late monsoon is followed by no later rain.

Sarson (*Brassica campestris*) gave a very disappointing yield, probably owing to excessive moisture in the seed bed. It was not possible to get a sufficiently fine tilth to admit of leaving the furrows open for a day before sowing as is commonly done for this crop.

Crop Experiments.

Of staple crops, groundnuts, soybeans, American cotton, and sugarcane are all new crops on the plateau, the best means of growing which have to be ascertained.

Groundnuts.—The varieties of groundnut differ very much in their habit and period of growth. The recognized varieties Raipur Local, Pondicherry, Spanish, and Small Japanese, are grown on the farm on a field scale to determine their agricultural value. In addition, plant to plant selection is in progress.

The Spanish and Small Japanese, both upright varieties, seem to be definitely too early for sowing at the normal season, as they become so diseased before harvest that their chief merit—that of ease of harvesting—is lost. Sown later they are difficult to keep clean, but they may prove useful on clean land.

The large erect variety obtained from Bombay, and those selected on the farm grew very well, but were sown some way down the slope of the hill and were waterlogged early in the season, so no opinion of their merits could be formed. The same was the case with the descendants of some crosses between the upright Spanish and some unknown spreading variety which were selected in 1915 and 1916. Moreover owing to the very straggly growth of some of the hybrids and the subsequent complete rotting of the stems, the lines were obliterated and the produce had to be bulked. This seed was therefore sown singly at wide intervals on high ground in the current season, and is providing a mass of heterogeneous material for further selection. The Pondicherry variety and one of the selected upright strains from the Raipur variety show a definite tendency to suffer less from disease than other varieties.

Soybeans.—The varieties of soybeans obtained from Sabour are enumerated in Table III. They were sown in the 3rd week in July, and the yields give no idea of the relative cropping power because some ripened too early and some too late to give a full crop. The best date for sowing each variety was estimated from the appearance of each in October, with a view to the current season's sowings, and is shown in column 4 of the table.

TABLE III.

Outturn of Soybean varieties.

Serial No.	Name of variety.	Yield per acre, 1917.	1918.	
			Date fixed for sowing.	Seed rate.
1	Rice land ...	1,330	July 21st	26 lbs. per acre.
2	Yellow, upright ...	725	August 15th	40 lbs. „ „
3	Black, late ...	930	June 15th	20 lbs „ „
4	Pale, chocolate ...	1,226	July 7th	24 lbs „ „
5	Yellow	888	May 15th to June 15th	10 lbs. „ „
6	Barmeli	1,330	July 1st	20 lbs. „ „
7	Simla	530	August 21st	40 lbs „ „
8	Barchet	1,194	July 14th	30 lbs. „ „
9	Greenish, yellow ...	560	„ 14th	30 lbs. „ „
10	Black Motted, Java ...	1,138	„ 21st	36 lbs „ „
11	Assam	1,600	„ 7th	24 lbs. „ „
12	Black, early... ...	1,532	June 30th	20 lbs. „ „
13	Black, Java... ...	1,136	July 21st	36 lbs. „ „
14	Chocolate	800	June 1st	10 lbs. „ „

The best of the yields obtained would be profitable if the produce could be marketed, and as the crop seems to be specially suited to local conditions its possibilities will be systematically investigated with a view to export. Meanwhile the produce is used on the farm for feeding milch cow and calves.

A large white variety, probably Manchurian, was obtained from the Deputy Director of Agriculture, Northern Circle, Madras Presidency, and sown in the current season. It has proved to be a mixed sample as regards habit and will provide material for selection.

Cotton.—The varieties mentioned in last year's report, and shown in table IV were grown on plots of 1—10th acre—3 lines 200 yards in length, of each variety.

TABLE IV.

Experiment of Cotton varieties.

Serial No.	Name of variety.	Yield per acre in lbs. of seed cotton.	Remarks.
1	Cotton F 4 (Lyallpur) ...	47	Very unhealthy and too early.
2	Do. K 7	65	Apparently unsuited to the climate, flowering too early and again too late.
3	Do. K 22	60	
4	Do. K 28	55	
5	Do. Sindhwahi cross ...	29	These are C. P. Varieties and probably require a longer season.
6	Do. Rossum	17	
7	Do. Kherua	231	From Manbhu m (khaki lint).
8	Do. from Rengarih ...	161	From the plateau.
9	Do. Barka do.	211	
10	Do. C a 1	210	Cawnpur selected American varieties.
11	Do. C a 2	130	
12	Do. C a 5	243	
13	Do. C a 10	255	
14	Do. C a 11	246	
15	Do. C a 18	86	
16	Do. C a 23	264	
17	Do. C a 28	177	
18	Do. F 287 (Lyallpur) ...	154	Not healthy.
19	Do. F 286 (Lyallpur) ...	75	
20	Do. Barhiya Kapas ...	25	Too late for the plateau and very unhealthy.
21	Do. Sindh American Texas big boll.	41	Very unhealthy and evidently unsuited to the locality.
22	Do. Triumph	77	
23	Do. Griffin	60	

The crop suffered severely from excessive rain, and the American varieties were attacked by insects of all kinds. The Indian varieties all appeared healthy but, nevertheless, even the best local variety gave no larger a yield than the best of the Cawnpur selections.

Burhiya (commonly known as Buri) kapas, an American variety, acclimatised in Manbhum, failed as completely as 'Lyallpur 4F'.

The Cawnpur selections are merely selected individual strains of the same type of cotton, and that some of them should have produced only about half as much as others illustrates the necessity of careful trial and selection to suit the local conditions.

A few single plant selections were made, and variety trials are being continued.

Mixed samples of cottons grown in the Northern Circle, Madras Presidency, have been obtained from the Deputy Director of Agriculutre for growing under observation.

A large area of the best of the Cawnpur varieties has been sown in the current season and has been earthed up so as to throw off excessive rain. So far they have done very well, presenting a marked contrast to last year's crop in appearance.

Sugarcane.—The varieties mentioned in last year's report were grown on a total area of $\frac{1}{16}$th acre of under-drained swamp. They were highly manured and did extraordinarily well. After planting $\frac{1}{2}$ acre with all the available canes of the varieties that did best, the remainder of the canes were sold for chewing in Ranchi for Rs. 48.

The following varieties, viz. :—

Ashy Mauritius,
Red Sport from Striped Mauritius,
Striped Mauritius,
D 74,
Java Hebbal,
" 33
" 33*a*
" 139
" 247
Barbadoes 147,
" 208
Khari,
Pansahi,
Madras Cheni,
Dacca Gandari,
Yellow Tanna,

have been retained for further trial or procured during the year under report. They were planted between the rows of potatoes and were not irrigated after the potato crop was dug, and are doing very well.

An additional three acres of first class paddy land has been drained and comparative trials to ascertain the yield of *gur* from the different varieties will be made as soon as possible.

Paddy.—Sixty local samples of paddy have been collected and are being grown under observation with a view to the elimination of inferior classes and subsequent single plant selection. The Central Provinces selected 'Gurmatia' and two samples from Madras are being tried alongside these.

Florida beggar-weed—(*Desmodium tortuosum*) was grown to test its value as a forage or green manure crop. It did not grow sufficiently vigorously or rapidly to compete with other crops for these purposes.

Marua.—(*Fleusine Coracana*).—Four strains of 'ragi' selected for their high yield were obtained through the courtesy of the Director of Agriculture, Mysore, also a mixed sample from the Deputy Director of Agriculture, Northern Circle. Madras Presidency. These are being grown alongside the local variety, under observation.

Jowar.—(*Sorghum*).—A variety of fodder jowar known as 'Pedda Jonna' which can be cut frequently, was obtained from the Deputy Director of Agriculture, Northern Circle, Madras, and will be compared with the local 'Gangai' for fodder and silage.

Beans.—Of the beans mentioned in last year's report as obtained from America, 'Yellow tepary' beans are being sown again in the current season. The growth of all the others was disappointing and they do not seem likely to make field crops.

The 'white tepary' beans sown in August again produced a sample far inferior to that given by February sowing; the Deputy Director of Agriculture, Orissa, has arranged to try them for January sowing at Cuttack where pulse crops are commonly sown at that season.

'Burma beans' (*Phaseolus lunatus spp.*) did very well on a garden scale and the seed obtained is being sown in the field in the current season.

'Mashyem kalai' (*Phaseolus calcaratus Roxb.*) sown on July 15th was completely eaten by 'Bihar hairy' catipillars in November, before any seed was formed. In the current season it could not be sown sufficiently early because of excessive rain, and as a fodder crop the soybean, of which a variety is available for sowing at every successive fortnight, seems likely to be more practically useful.

Potatoes.—The varieties of potatoes given in table VIII, most of which were obtained from the Upper Shillong Experiment Station, were sown late and gave fair yields. But the land was newly drained and the yields of individual varieties are not strictly comparable. The produce was attacked by potato moth and was sold off as quickly as possible. More accurate comparative trials will be made when the land can be brought under control, and the efficacy of storing under sand immediately after harvest will be tested.

Manurial Experiments.

Table VI shows a scheme of phosphatic manurial experiments planned with a view to ascertaining whether any kind or quantity of phosphatic manure would have any effect in mitigating the severity of disease in groundnuts.

TABLE VI.

Experiment series.

Crop—Groundnuts.

Plot No.	Manure per acre in lbs.					Containing approximately,	Remarks.
	Superphosphate.	Gypsum.	Basic slag.	Apatite.	Sulphur.	P 2°5.	
1	2	3	4	5	6	7	8
1	1,500	...	...	...	...	300	
2	...	240	...	...	...	Nil	
3	750	...	...	...	...	150	
4	...	240	...	...	...	Nil	

TABLE VI—*concluded.*

Plot No.	Manurte per acre in lbs.					Containing approximately.	Remarks.
	Superphosphate.	Gypsum.	Basic slag.	Apatite.	Sulphur.	P2°5.	
1	2	3	4	5	6	7	8
5	450	...	...	...	...	90	
6	...	240	...	...	...	Nil	
7	450	...	...	...	...	99	
8	450	...	...	...	...	90	Limed 1915.
9	750	...	...	...	...	150	100lbs was applied after the 2nd weeding.
10	...	240	...	...	...	Nil	
11	400	...	...	...	...	80	
12	...	240	2,240	...	...	80	
13	...	240	2,800	...	...	100	
14	...	240	5,600	...	...	200	Lime and Bonemeal in 1915.
15	...	240	...	500	...	200	
16	...	240	...	940	...	375	
17	...	240	...	1,880	...	750	
18	1,500	...	...	...	...	300	
19	...	240	...	2,820	...	1,125	
20	...	...	...	2,820	40	1,125	Not previously manured.

The whole field was badly diseased and none of the manures appeared to have the smallest effect. The crop was a very poor one all over and the yields of the several plots were not significant from the comparative point of view.

It may be definitely concluded that deficiency of phosphates does not contribute materially to the liability of groundnuts to disease on the plateau.

In order to ascertain whether deficiency of any other essential mineral were responsible, the ashes of such a weight of leaves, stalks and nuts as would normally grow on the area covered by ten rows of one of the unmanured plots, were dissolved in water and applied to one row. The undissolved residue was dissolved in sulphuric acid and applied after dilution to another row. The treated rows were as diseased as the remainder of the plot. It therefore seems unlikely that the liability of the crop to disease is due to any deficiency of soluble mineral requirements.

Oats were grown on the field after the groundnuts were harvested. The crop was not even enough nor the plots numerous enough for accurate comparative purposes, but a very good idea of the general effect of the manure could be formed from the appearance of the plots.

Apatite had clearly no effect whatever, superphosphate and basic slag produced crops thicker about in proportion to the amounts of the manures applied, basic slag having an effect similar to about half its content of phosphoric acid applied in the form of superphosphate.

The results of an experiment designed to test the effect on the yield of groundnuts of phosphoric acid with and without considerable quantities of lime, are shown in table VII.

TABLE VII.

Crop—Groundnut.

Plot No.	Manure per acre.				Containing approximately.			Yield.
	Gypsum.	Superphosphate.	Slake lime.	Basic Slag.	P 2°5.	C a O.	S.	
1	2	3	4	5	6	7	8	9
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
1	160	...	...	...	...	40	30	*a* 17 / *b* 12·5
2	...	400	...	...	80	40	30	*a* 22 / *b* 14·5
3	...	400	1,152	...	80	810	30	*a* 29 / *b* 27·5
4	...	400	...	...	80	40	30	*a* 17 / *b* 11
5	...	400	1,152	...	80	810	30	*a* 18·5 / *b* 11·25
6	160	...	...	2,240	80	810	30	*a* 21 / *b* 22·5
7	...	400	1,152	...	80	810	30	*a* 23 / *b* 21
8	160	...	...	2,240	80	810	30	*a* 22 / *b* 12
9	160	...	...	...	...	...	30	*a* 16·5 / *b* 17·5
10	160	...	...	2,240	80	810	30	*a* 24 / *b* 23
11	...	400	1,152	...	80	810	30	*a* 18 / *b* 22·5
12	160	...	...	2,240	80	810	30	*a* 21 / *b* 17·5
13	...	400	1,152	...	80	810	30	*a* 18 / *b* 15
14	...	400	...	...	80	40	30	*a* 9·5 / *b* 8
15	...	400	1,152	...	80	810	30	*a* 14·8 / *b* 17
16	...	400	...	...	80	40	30	*a* 11 / *b* 12
17	160	...	...	...	...	40	80	*a* 14·75 / *b* 14·5

All the plots that did not get superphosphate, were given gypsum supplying as much calcium sulphate as was present in the superphosphate.

The amounts of superphosphate applied were such as to supply the same quantity of phosphoric acid as was contained in a ton of the basic slag from Sakchi, and lime was applied to 6 of the superphosphate plots in quantity approximately equal to that present in the basic slag.

The plots, which were 44 yards long by 11 yards wide, were divided lengthwise in half for harvesting, with a view to comparing only narrow strips lying alongside one another. The yields were so low as to magnify the experimental error disproportionately but it is clear that the phosphoric acid had a negative effect, while the lime both in the basic slag and as slaked lime gave a considerable increase. It is also clear that manuring could not pay in a season like that under report.

The yield of potatoes manured respectively with 800 lbs. to the acre of superphosphate and with the amount of sulphur equivalent to that present in the superphosphate, in addition to farm yard manure on each plot, are shown in table VIII.

TABLE VIII.

Potatoes.

Name of Variety.	Farm yard Manure plus 60 lbs sulphur per acre.	Farm yard Manure plus 800 lbs. superphosphate per acre.
	Yield.	Yield,
1	2	3
	lbs. per acre.	lbs per acre.
Local	4,920	9,377
Naini Tal	8,742	12,900
King of Potatoes	6,672	13,580
Magnum Bonum	6,340	14,606
Windsor Castle	10,340	18,193
British Queen	10,556	19,306
Imperator	7,455	15,507
Average	7,862	14,781

The varietal plots were small and germination not sufficiently even to give strictly comparable results, but the effect of the phosphate as compared with sulphur on plots totalling 1-6th acre under each manure was marked, the crop being almost doubled. The plants grew much quicker and were much more vigorous on all the superphosphate plots.

Cultivation experiments.—Two of the Farm ploughmen were sent to Nandyal in the Madras Presidency, where the Deputy Director of Agriculture of the Northern Circle kindly arranged to have them trained in the use of the local drills and hoes.

The greater part of the cotton crop on the farm was drilled with a three tined drill in the current season and subsequently earthed up with a *desi* plough. The Madras hoes are of doubtful utility on the farm soils in a wet season.

Subsoil drainage.—The potatoes were grown after a crop of *dhaincha* ploughed in, on half an acre of swampy paddy land with brick drains 2½ feet deep and 12 feet apart.

Water for irrigation was obtained from the higher paddy fields. The potatoes were sold for Rs. 100 and sugarcane setts were planted between the rows of growing potatoes and received no irrigation after the potatoes were dug. The gross revenue obtainable on swampy land treated in this manner is so high as to dwarf the initial expenditure of Rs. 150 per acre on draining and levelling, and even where irrigation from higher ground is not practicable water can be obtained within a few feet by digging a shallow well.

Three acres more have been drained with tile pipes locally made and costing about Rs. 15 per 1,000 delivered on the spot.

Both the digging of the drains and the purchase or manufacture of the pipes are within the means of the cultivator but the grading of drains and laying of the pipes require expert supervision.

In this respect the position is very similar to that of well boring in alluvial soils and the experiments on the farm are being extended with a view to ascertaining the economic possibilities of the system and training an expert staff.

Fodder and silage experiments.—Owing to the high water-level a drain had to be made round the silohs. The pits 5 feet deep were increased to 15 feet in diameter so as relatively to minimise the loss by rotting at the sides. Soybeans and grass and jowar were used, the last only being chaffed.

The rotting at the sides was again considerable and a 10" wall has been built from 5 feet below the ground to 5 feet above ground in each siloh in the current season.

The soybeans made the best silage, and was much relished by the cattle. After cutting the soybeans a fair cold weather crop was grown.

For those who have enough land to keep over 20 head of cattle (which is the minimum number for which it is economically possible to make silage) the system of growing leguminous fodder crops for putting into a siloh at the end of August and ploughing the land up immediately for a cold weather crop, has the advantage of spreading the labour more evenly over the year.

The large amount of fodder provided enables a larger number of cattle to be kept than would otherwise be possible on the same area, and thus supplies the manure that is essential to the successful growth of cold weather crops.

A small landowner would thus be able to employ regular labour, breed his own cattle, and supply his family with milk on a conservative system without a large grazing area.

Such a system is essential to the satsfactory working of the farm, which has hitherto been too dependent on the fluctuations of the local labour supply.

An increase of the number of milch cows on the farm would therefore tend to economy while the milk could easily be disposed of to the staff of the neighbouring lunatic asylum. The farm cattle sheds are however already full and in view of the present cost of building materials no immediate expansion is contemplated.

Disposal of produce.—Groundnuts and sarson and coarse paddy were transferred to the Ranchi Jail at current rates. 321 maunds of Indrasail, Badshahbhog and Dadkhani paddy were despatched to the order of the Deputy Directors of Agriculture of the Patna, Bhagalpur and Orissa Divisions for distribution.

Fine paddy was sold in Ranchi, as also oats and barley and jowar. Other produce was fed to the farm cattle.

Receipts and expenditure.—The total receipts for the year were Rs. 1,780 and the expenditure Rs. 8,926 including Rs. 1,372 spent on levelling and draining but exclusive of the pay of the Superintendent, overseer and clerk. Almost the whole stock of paddy was carried over into the current year.

Staff.—The Farm has lost by the transfer of Babu Bhutnath Sarkar, who had been Superintendent for two years, to the appointment of Assistant Botanist. His keen interest in practical work was chiefly responsible for the heavy yields of paddy obtained on the Farm.

Babu Nanda Lal Das worked with dilligence as Farm Clerk and subsequently as Overseer—an appointment that has proved absolutely necessary in view of the constant changes occurring in the management of the Farm during the training of prospective or passed College students.

Report on the working of the Sepaya Cattle Breeding Farm in the District of Saran for the year ending 30th June 1918.

I.—Charge of the Farm.

I held charge of the Farm throughout the year. I availed of privilege leave for one month and four days from 3rd September to 6th October 1917.

II.—Area of the Farm.

The original area of the Farm, viz, acres 234·18 was increased by acquisition by acres 144·73 during the year, thus bringing the total area up to acres 378·91 made up as follows:—

	Acres.
(*a*) Under Cultivation	258·81
(*b*) Grazing	70·00
(*c*) Buildings, Roads, Banswari, Homestead, Orchard, etc, ...	50·10
Total ...	378·91

The area under (*c*) will be reduced during the coming year by approximately acres 25 and that under (*a*) increased by that amount.

III.—Breeding Herd.

1. At the commencement of the year under report the entire herd consisted of 273 head while at 31st June 1918 it stood at 289 composed as follows:—

Stud Bulls	3
Cows	97
2 to 3 year Calves, Male	32
„ „ „ „ Female	10
1 to 2 year Calves, Male	45
„ „ „ Female	15
Calves under 1 year, Male	42
„ „ „ Female	45
Total ...	289

2. During the year, 89 Calves—42 males and 47 females—were born. [Of these, 48 were sired by Stud Bull No. 49 (Raj Mangal), 38 by Bull No. 39 (Ramdin) and 3 by Bull No. 2 (Rajkumar).]

3. Two old cows, and one male and three female calves died during the year.

4. Thirty-five female calves and a cow with a female calf at heel, not required in the herd, were sold by public auction on the farm in the months of October 1917 and March 1918 and realized the sum of Rs. 574. Thirteen female calves were sold to the Bettiah Estate for the sum of Rs. 236.

Seventeen young bulls of breeding age were sold to District Boards, Central Co-operative Banks and others for the sum of Rs. 2,775 during the year.

				Rs.
1.	Bull No. 11	to the Central Co-operative Bank, Madhipura		175
2.	Ditto „ 9—4-4	ditto ditto	Supaul ...	175
3.	Ditto „ 8	ditto ditto	Gaya ...	175
4.	Ditto „ 16	ditto ditto	Nawadah ...	160
5.	Ditto „ 14	to Mr. Severs, Telhara Factory	...	200
6.	Ditto „ 1	to the Deputy Commissioner, Ranchi	...	100
7.	Ditto „ 10—1-5	to Sursand Estate, Muzaffarpur	...	175
8.	Ditto „ 10—4-4	to the Central Co-operative Bank, Jahanabad		160
9.	Ditto „ 5	ditto ditto	dit'o ...	160
10.	Ditto „ 6	ditto ditto	ditto ...	175
11.	Ditto „ 7—4-4	to District Board, Shahabad ...	...	150
12.	Ditto „ 15	ditto ditto	... ...	150
13.	Ditto „ 9	to the ditto ditto	... ...	160
14.	Ditto „ 12	ditto ditto	Monghyr ...	175
15.	Ditto „ 13	ditto ditto	ditto ...	150
16.	Ditto „ 3	ditto ditto	Muzaffarpur ...	175
17.	Ditto „ 7	to the Central Co-operative Bank, Bihar	...	160
		Total	...	2,775

Altogether sixty-seven animals were disposed of during the year under report and are not included in the total of 239 given in paragraph III—1.

5. The three Stud Bulls are continuing to do their work satisfactorily. Bull No. 49 has sired 48 calves (22 males and 26 females). Bull No. 39 has sired 38 (19 males and 19 females) and Bull No. 2 has sired 3 (2 females and 1 male) during the year; while some seventy cows are at present pregnant to the three Bulls.

6. Young Stock are doing well, and there should be some forty-six Bulls fit for distribution during the coming year. Of these, one is to be kept as a prospective Stud Bull of the Farm. He was purchased with his dam from the Shahabad Diarah, and is therefore outside blood on both sides.

7. There was no case of infectious or contagious disease, and the general health of both the breeding and agricultural herd was excellent.

8. Ninety-six general cases were treated during the year under report.

9. Babu Man Mohan Banerji, Veterinary Assistant, was in charge of the Veterinary Dispensary throughout the year.

IV.—Sale of Milk.

Lbs. 23,094—4 oz. of milk was sold to staff and outsiders, and realized the sum of Rs. 837-11-1. [Table A of Appendix gives details month by month.]

V.—Agricultural Herd.

There were forty-six bullocks in stock for agricultural purposes at the beginning of the year. Thirty-five bullocks were purchased during the year and one old bullock died of "Diabetes Insipidus". The total number at the end of the year was 80.

VI.—Agricultural Operations.

A. (*a*)—*Experimental Sugarcanes* (*Saccharum officinarum*) *planted during the year* 1917-18.—Eighty-eight varieties of Sugarcane—fifty-three varieties received in the year 1913-14 from various places, such as Sabour, Pusa, Otter and Sathi, six varieties received from Queensland in January 1915, one variety procured locally in the year 1917, twenty-six varieties received from Coimbatore in March 1918, one variety received from Babnowli in February 1918, and one variety received from Sathi in March 1918—were successfully planted out in an area of six acres in the months of February and March 1918. The entire area, in addition to being green manured with Sann hemp (*Crotolaria juncea*) had a dressing of 15 tons per acre of mixed litter and dung prior to planting.

The 60 varieties of previous years are on the whole doing well.

The 26 Coimbatore varieties also promise well and a survey of these made on 24th July 1918 is given as Appendix B.

"J-33" received from Bubnowlie was so badly smutted that under the advice of the Imperial Mycologist all was dug out and burnt.

The Sathi No. 3 variety is doing well.

(*b*) *Disposal of Experimental Sugarcanes planted during* 1916-17.—After using as much as was required for planting during the current season, the balance, about 4·50 acres, were disposed of as follows :—

	Cwts.	Mds.
1. Fed to Cattle	1357·78	1,848
2. Sold to outside persons	487·03	662·87
3. Sold locally	99·55	135·50
Total ...	1944·36	2646·37

The area under these canes was 6 acres and the average outturn per acre was 397·25 cwt. equal to 540·75 mds. All have been kept for a Ratoon crop.

(*c*) *Analyses of Experimental Sugarcanes planted during* 1916-17.—In the months of January and February of the current year these canes were analysed at Sepaya under the direction of the Government Agricultural Chemist, Sabour.

Table C of the Appendix gives the weight and analysis of each variety.

B. (*a*)—*Fodder Sugarcanes Planting of* 1918.—The areas detailed below have been put under the following varieties of sugarcane in the year 1918 :—

	Acres.
(*a*) Khari	9·83
(*b*) Manaria	·40
(*c*) Panshahi	·39
(*d*) Saretha	·20
(*e*) Java 33	·44
(*f*) Hemja	12·74
Total ...	24·00

"Java 33" was received from Babnowlie but being entirely affected by smut was uprooted and burnt.

(*b*) *Fodder Sugarcanes Planting of* 1917.—As stated in last year's report, 14·38 acres of Hemja and Khari Cane were planted out. These canes were harvested during the current year and gave good results. The average outturn per acre of Hemja Cane was 340·40 cwts. equal to 463·31 mds. while that of Khari Cane was 491·40 cwts. equal to 663·86 mds. Of the above area 9 acres have been retained for a Ratoon crop.

(*c*) *Results of Sulphate of Ammonia* versus *Castor Cake on Hemja Cane for fodder.*—At the time of planting fodder Cane in the month of February 1917, three plots were set aside for Experiment with Sulphate of Ammonia and Castor Cake. Plot No. 1 measuring ·88 acre and Plot No. 3 measuring ·33 acre had 3·57 cwts. of Sulphate of Ammonia and 17·67 cwts. Castor Cake respectively applied in the trenches along with the seed. Plot No. 2 measuring ·88 acre had no manure at this stage. Later at the time of earthing up, Plot No. 1 had a top dressing of 3·57 cwts. Sulphate of Ammonia, while Plot No. 2 had a similar top dressing with Sulphate of Ammonia and Plot No. 3 had no further manure.

The following are the results of weighments of Cane of the three plots and indicate that Castor Cake is the most economical to use :—

Serial No.	Area in acres.	Manure applied.	Total outturn in Cwt.	Average outturn per acre in Cwt.	Average outturn per acre in Mds.	Cost of fertilizer per acre.
1	2	3	4	5	6	7
						Rs. a. p.
1	·88	Sulphate of Ammonia double application 7·14 cwts. per acre to supply 168 lbs. nitrogen.	421	478·44	651·42	108 7 0
2	·88	Sulphate of Ammonia single application as a top dressing 3·57 cwts. per acre, to supply 85 lbs. nitrogen.	404·83	460·03	626·13	54 3 6
3	·33	Castor Cake, single application at the time of planting 17·67 cwts. per acre to supply 88·90 lbs. nitrogen.	160·90	487·57	663·63	49 0 0

(*d*) *Fodder Sugarcane—Ratoons—Planting of* 1916.—Two acres of Cane were harvested during the year and the average outturn per acre was 132·61 cwts. equal to 180·50 maunds.

(*e*) *Sugarcane Ensilage*:—1,108 maunds (814·08 cwts.) of chopped sugarcane were put into one silo pit in February 1918 and was opened in the month of April 1918. Altogether 934 maunds (686·23 cwts.) of good stuff was obtained and fed to cattle, 55 maunds were rejected as dried and mouldy and loss in weight amounted to 119 maunds. Therefore 84 per cent. of the total weight put in was found to be good feeding and this may be considered successful.

1,870 mds. 27 seers (1,374·50 cwts.) of chopped sugarcane were put into a second silo pit in the month of May 1918. Results will be included in the next year's report.

(*C*)—*Fodder Crops other than Sugarcane.*

(*a*) *Juar* (*Andropogon sorghnum*).—55·47 acres were sown and reaped during the year and the average outturn per acre was 176·74 cwts. (240·56 mds.)

25·71 cwts. of Juar seed was obtained from 6·20 acres and the average outturn per acre was 4·14 cwts. equal to 5·93 mds.

(*b*) *Teff Grass* (*Eragsostis abassinica*).—53½ mds. (39·30 cwts.) of Teff grass were obtained from ·42 acre of land, the average yield per acre being 93·57 cwts. equal to 127·04 maunds.

(*c*) *Berseem* (*Trifolium alexandrinum*).—2·26 acres were sown and harvested during the year and the average yield per acre was 29·05 cwts. = 39·38 mds. 1·50 acres of the above yielded only ·16 cwt. of seed and the out turn per acre was ·10 cwt. or 11·2 lbs.

(d) Oats (Avena sativa).—The entire area under Oats was acres 96·78 of which acres 49·06 only had been green manured with Sann Hemp. With the exception of 1·29 acres which had no manure of any kind, the whole was treated with superphosphate, 56·52 acres at 1¼ cwt. per acre and 38·97 acres at 1 cwt. per acre. The total outturn was 1,197·61 cwts. = 1,630 mds. 17 seers of Grain and 1520·15 cwts. = 2,069 maunds 7 seers of Bhusa.

The following table shows the total and average outturn of Oats and Bhusa from the Old and the New areas separately :—

Serial No.	—	Area under Oats.	Total outturn in cwt.	Average per acre in cwts.	Average per acre in mds.	Remarks.
1	2	3	4	5	6	7
	OLD AREA.					
1	Grain... ...	55·37	874·47	15·79	21·48	
2	Bhusa ...		1154·93	20·85	28·25	
	NEW AREA.					
3	Grain... ...	41·41	323·28	7·80	10·63	
4	Bhusa ...		370·48	8·94	12·18	

The difference in outturns from the two areas is noticeable, and it will be interesting to note how the new area compares, after 2 or 3 years of green manuring plus artificial manures, with the Old Area.

With a view to testing our Farm grown Oat seed—obtained the previous year from Muzaffarnagar thus one year acclimatized—against freshly imported Mazuffarnagar seed--the Old Area as tabulated above was divided into two portions, one measuring 29·50 acres, was sown with the acclimatized, the other measuring 25·87 with freshly imported seed. The results obtained are tabulated below, and corroborate those of last year, which indicate that the seed is improved by acclimatizing for one year.

Serial No.	Area in acre.	Manure applied.	Outturn of Oats.	Outturn of Bhusa.	Outturn of Oats per acre.	Outturn of Bhusa per acre.	Remarks.
1	2		4	5	6	7	8
			Mds.	Mds.	Mds.	Mds.	
1	29·50	Entire area previously green manured and treated with superphosphate as follows :— 16 acres at 1¼ cwt. per acre, 13·50 acres at 1 cwt. per acre.	666·58 =Cwts. 489·33	850·95 =Cwts. 624·52	22·59 =Cwts. 16·58	28·23 =Cwts. 21·17	One year acclimatized seed.
2	25 87	Entire area previously green manured and treated with superphosphate at the rate of 1¼ cwt. per acre.	523·62 =Cwts. 384·26	713·7 =Cwts. 523·85	20—24 =Cwts. 1·85	27·58 =Cwts. 20·24	Freshly imported seed from Muzaffarnagar.

(e) Radishes (Raphanus sativus).—3·00 acres were sown and harvested during the year. The area was treated with superphosphate at 1¼ cwt. per acre after green manuring with sann hemp. The average yield per acre was 206·82 cwts. = 281·50 maunds.

(*f*) *Gram* (*Cicer arietinum*).—Two acres of land were sown in Kabuli gram. The area was green manured with sann hemp, and superphosphate at 1½ cwt. per acre was afterwards applied before sowing. The average yield per acre was 5·87 cwts. = 8·23 maunds.

(*g*) *Paddy* (*Oryza sativa*).—1·28 acres of Aghani paddy were sown and harvested during the year. The average yield per acre was 14·38 cwts. = 19·65 maunds.

D.—Fibre Crops.

(*a*) *Hibiscus cannabinus*.—As stated in last year's report, a plot of one acre was divided into two equal portions, one of which was sown with Mr. Howard's improved "Hibiscus cannabinus" and the other in "Local Patua" in the month of June 1918, in order to test the relative outturns of fibre per acre of each. The former yielded 3·25 cwts. equal to 4·42 maunds per acre while the latter yielded 2·59 cwts. equal to 3·52 maunds per acre. It appears from the outturn that the former gave better results than the latter.

(*b*) *Sann Hemp* (*Crotolaria juncea*).—2·93 acres of this crop were manufactured into fibre during the year for use on the Farm. The yield per acre was 5·28 cwts. equal to 7·17 maunds.

E.—Crops sown during the year under report for next year.

(I) *Fodder* :—

(*a*) *Juar* (*Andropogan sorghum*).—45·53 acres were sown from time to time from the month of February to June 1918. Under instructions of the Director of Agriculture, Bihar and Orissa, on the subject of application of superphosphate immediately before or just at the beginning of the rains, 9·70 acres in additional area were divided into two equal parts, one was manured with superphosphate at 1¼ cwt. per acre and in the other no manure was applied and both the plots were sown in the month of April 1918, in Juar, so as to determine the residual effect of the fertilizer on a succeeding Rabi crop. The plot treated during the rains would get no phosphate before sowing *Rabi*, while the untreated plot would be supplied with phosphate. The results will be reported in due course.

(*b*) *Maize* (*Zea mays*).—For ensilage 15 acres were sown in maize in the month of June 1918 after manuring with Farmyard manure at 15 tons per acre.

(*c*) *Paddy* (*Oryza sativa*).—1·50 acres were sown in three varieties of paddy for seedlings as detailed below —

	Acre.
(i) Indrasail in	·50
(ii) Bhainslot in	·50
(iii) Muneshara in	·50

Indrasail paddy seed was received from the Deputy Director of Agriculture, Patna Circle.

(II) *Fibre* :—

Jute (*Corchorus Sp.* ?).—4·00 acres were sown in K. B. Jute in the month of May and June 1918. The seed of K. B. Jute was received from the Fibre Expert, Dacca, to whom the seed of the present crop will be sent for distribution elsewhere.

(III) *Green Manuring* :—

Sann Hemp (*Crotolaria juncea*).—91·18 acres were put under this crop during May and June for green manuring for the next *Rabi* Crops.

F.—Manuring of various kinds.

During the year under report the following manuring was carried out :—

(*a*) With Farmyard manure averaging 12·75 tons per acre.

	Acres.
For Sugarcane	30·09
„ Juar	10·83
„ Maize	13·00
„ Oats	7·38
Total ...	61·21

(*b*) With Sann Hemp and Meth (*Phaseolus aconitifolius*) turned in green in the months of July and August 1917 followed in October and November by a top dressing of superphosphate—20—22 per cent. water Soluble Phosphoric Acid—at the average rate of 126 lbs. equal to 1·12 cwt. per acre.

	Acres.
For Oats	41·11
„ Radishes	3·00
„ Kabuli Gram	2·00
„ Berseem	3·22
Total ...	49·33

VII.—Building operations.

The four new Bull Stalls referred to in last year's report, were duly completed and occupied, as also the new Stable and Coach House.

The original Chaff-cutting house proving to be too small to accommodate the New combined Ensilage Cutter and Blower, was extended by 6 feet, and the corrugated iron roof replaced by a tiled one of the pattern of our other buildings.

Five new Cow Stalls were practically completed and have been occupied for some time.

A *pacca* drain extending from the Manure Pits for a distance of 226 feet to the north, was completed.

The old culvert on the main road opposite the Manure Pits was dismantled, raised and widened, and now carries away all drainage water without interruption.

The *pacca* platform and drain surrounding the New Well at the Cowstalls was completed.

White-washing and petty repairs of all buildings were undertaken.

VIII.—Laying out.

All our Roads were put in good order. 3,042 square feet of ground in front of the Chaff-cutting house was metalled with old brick rubbish as a dumping ground for green fodder. All Drains were cleaned out and kept in thorough working order. Some earth filling was done near Engine House, by the side of the Paddock north of old Banswari, and in front of the four new Bull Stalls built during the year. 110 Mango, Mahua and other trees were cut in New Area in order to bring the land under cultivation and to provide wood for Engine fuel and for other Farm work.

All necessayr material for the fencing in of the New Area was purchased during the year.

IX.—Implements and Machinery.

A new "Climax G-3" combined Ensilage-Cutter and Blower was purchased and has proved a great boon.

Table D gives details of all Machinery in stock at the end of the year.

X.— Acquisition of Land.

In addition to the area mentioned in paragraph II, 7·38 acres of land was acquired for providing building sites for the tenants whose houses were included in the Acquisition proceedings.

XI.—Training of Agricultural Students.

One student was allotted to this Farm for training. A separate report regarding his attainments has been submitted to Director of Agriculture.

XII.—Charitable Dispensary.

I have again to regret that this very important desideratum is still in the vista of the future.

XIII.—Floods of the Gandak river.

There was no rise of consequence in the Gandak during the year.

XIV.—Visitors to the Farm.

The following Officials visited the Farm at different periods during the year :—

1. G. Milne, Esq., I.C.S., Director of Agriculture, Bihar and Orissa.
2. F. M. Luce, Esq., I.C.S., Collector of Saran.
3. G. F. Owen, Esq., I.C.S., Subdivisional Officer, Gapalganj.
4. C. Somers Taylor, Esq., Principal, Agricultural College, Sabour.
5. D. Quinlan, Esq., Superintendent, Civil Veterinary Department, Bihar and Orissa.
6. Mr. S. N. Sil, Assistant Professor of Agriculture, Agricultural College, Sabour, with 26 college students.
7. Mr. J. N. Chakravarti, Superintendent, Rangpore Dairy Farm.

XV.—Tour of the Superintendent.

The Superintendent was on tour for 44 days during the year.

XVI.—Rainfall.

The following is a statement of rainfall for the year ending 30th June 1918 :—

	Inches.
July 1917	12·88
August „	4·81
September „	8·56
October „	1·17
November „	·00
December „	·00
January 1918	·00
February „	·00
March „	·25
April „	1·45
May „	4·06
June „	10·54
Total ...	43·72

XVII.—Receipts and Expenditure.

The following is an abstract of Receipts and Expenditure for the year ending 30th June 1918.

Details are given in Table E of the Appendix:—

	Rs.	a.	p.
Gross Receipts	3,076	9	7
Expenditure.			
Establishment	17,966	15	10
Travelling allowances	800	7	3
Contingent charges	31,164	1	11
Non-recurring charges	8,422	4	0
Total ...	58,353	13	0

M. M. MACKENZIE,

Superintendent, Sepaya Farm.

TABLE A.

Statement showing the quantity of Milk sold during the year ending 30th June 1918.

Serial No.	Month.	Quantity sold.	Value.	Remarks.
1	2	3	4	5
		Lb. Oz.	Rs. a. p.	
1	July 1917	2,370 8	95 9 6	
2	August „	1,328 0	52 11 3	
3	September „	1,148 8	45 14 10	
4	October „	1,623 0	63 14 5	
5	November „	1,715 0	69 3 1	
6	December „	1,449 8	59 11 1	
7	January 1918	1,868 8	73 14 4	
8	February „	2,449 8	86 7 9	
9	March „	2,862 0	73 11 7	
10	April „	2,183 8	53 10 4	
11	May „	2,470 4	100 15 5	
12	June „	1,626 0	61 15 6	Deposited into Treasury in July 1918.
	Total ...	23,094 4	837 11 1	

M. M. MACKENZIE,

Superintendent, Government Cattle Breeding Farm, Sepaya.

TABLE B.

Statement showing the percentage of germination, growth and height of Coimbatore Sugarcane planted during the year 1918.

Serial No.	Name of Canes.	Percentage of germination.	Growth.	Height on 24-7-1918.	Remarks.
1	2	3	4	5	6
		per cent.			
1	Co. 201	80	Fair ...	3½′	All these canes were planted out on 5th March 1918.
2	Co. 202	80	Fair ...	3½′	
3	Co. 203	60	Poor ...	2½′	
4	Co. 204	90	Good ...	5′	
5	Co. 205	90	Good ...	5′	
6	Co. 206	80	Good ...	3½′	
7	Co. 207	80	Good ...	3½′	
8	Co. 208	60	Poor ...	2½′	
9	Co. 209	80	Good ...	4′	One stool smutted and cut out on 24th July 1918.
10	Co. 210	80	Good ...	4′	
11	Co. 211	80	Good ...	4′	
12	Co. 212	80	Fair ...	3′	
13	Co. 213	90	Good ...	4½′	
14	Co. 214	75	Fair ...	3½′	
15	Co. 215	60	Fair ...	3′	
16	Co. 216	80	Good ...	3½′	
17	J. 33*a*	25	Very Poor ...	2′	
18	J. 36	40	Poor ...	1½′	
19	J. 139	75	Fair ...	2½′	
20	J. 213	60	Poor ...	2′	
21	J. 247	20	Poor ...	2′	
22	Kassoer	25	Fair ...	3½′	
23	Taboe Monjet	50	Fair ...	2½′	
24	Co. 1	35	Fair ...	3′	
25	Ashy Mauritius	50	Very Poor ...	1½′	
26	Red Mauritius	30	Very Poor ...	1½′	

M. M. MACKENZIE,

Superintendent, Government Cattle Breeding Farm, Sepaya.

TABLE C.

Statement showing the areas, weights and analyses of Experimental Sugarcanes planted in the months of February and March 1917 on the Sepaya Farm in the District of Saran.

Serial Number.	Name of Cane.	Area in acre of both original and check plots.	Outturn of both plots in cwt.	Outturn per acre in cwt.	Result of analysis.								Remarks.
					Percentage of Sucrose.		Percentage of Glucose.		Quotient of Purity.		Percentage of the juice in the cane.		
					Analysed in January.	Analysed in February.	Analysed in January.	Analysed in February.	Analysed in January	Analysed in February.	Analysed in January	Analysed in February.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Australian Rappoe... ...	·038	23·32	613·68	11·97	...	·54	...	·72	...	73·7	..	
2	Do. Mahona ...	·029	14·32	492·42	11·86	...	·95	...	72·1	...	67·7	...	Slight attack of red rot and borer.
3	Do. D. 1135 ...	1·54	873·41	567·14	10·73	11·28	·88	·51	76·4	75·2	48·8	50·0	Heavy attack of borer. About 10 per cent.
4	Do. No. 4	·288	112·14	389·37	12·27	14·96	1·03	·71	71·7	87·3	84·8	57·5	
5	Do. No. 5	·05	15·06	301·50	17·06	...	1·00	...	94·3	...	76·2	...	Slight attack of borer.
6	Do. No. 6	·055	28·28	514·18	17·69	...	·82	...	96·8	...	69·0	...	
7	Saretha	·091	40·76	447·91	16·84	...	·24	...	86·0	...	65·2	...	
8	Red Tana	·10	41·41	414·10	13·06	16·72	1·09	·95	75·4	90·8	75·7	...	
9	Banaresi Nepali	·103	27·73	269·20	13·42	16·51	1·76	1·05	84·3	89·9	96·6	50·5	
10	Bhuri	·10	20·38	203·80	13·88	15·68	1·32	1·14	86·1	88·2	76·4	56·2	Slight attack of borer and red rot.
11	White Mauritius I ...	·103	32·87	319·12	15·18	...	·84	...	91·2	...	74·7	...	
12	Red Mauritius II	·103	41·69	404·75	14·05	17·52	1·06	·88	85·8	92·0	62·8	55·0	
13	Ditto I	·103	31·59	306·69	15·92	15·74	1·32	1·34	85·7	87·1	68·3	43·1	
14	Mukti Mungo	·103	32·51	319·12	12·43	...	Less than 2.	..	86·1	...	58·9	...	
15	Bansa	·103	35·36	319·12	11·73	...	·61	...	83·0	...	62·6	...	
16	Red Mauritius III ...	·10	31·59	315·90	16·74	16·01	·71	·80	93·8	92·8	71·5	60·4	
17	Kuswar	·10	22·77	227·70	14·43	...	·34	...	88·1	...	57·7	...	
18	Hemja	·10	32·51	325·10	13·46	...	Less than 2.	...	83·7	...	56·6	...	
19	Khari	·10	62·81	628·10	13·77	...	·49	...	85·9	...	64·0	...	
20	Manaria	·10	37·10	371·	10·36	...	1·26	...	74·1	...	65·0	...	
21	Bombay	·10	41·51	415·10	14·87	17·06	1·26	1·07	87·3	89·2	73·6	54·0	
22	Red Bombay	·10	32·32	323·20	14·61	16·51	1·08	1·28	86·6	86·7	67·1	61·9	
23	Ketari II	·10	23·87	238·70	13·69	...	·82	..	82·2	...	64·0	...	
24	Red Java	·10	33·06	330·60	14·52	...	·76	...	85·3	...	68·1	...	Slight attack of red rot.
25	Mungo	·10	24·24	242·40	14·08	...	·32	...	88·7	...	56·2	...	
26	Panshahi	·10	42·61	626·10	12·16	...	·98	...	82·6	...	66·0	...	
27	Ketari III	·10	31·22	312·20	11·37	...	·82	...	78·8	...	65·6	...	
28	Kajla	·10	34·90	349·	12·45	14·45	1·45	1·32	78·6	83·1	57·5	52·88	
29	White Tana	·10	37·47	374·70	14·76	...	·76	...	87·6	...	69·4	...	
30	Dhal sundar	·042	25·71	612·14	13·36	...	·82	...	74·5	...	85·6	...	
31	Striped Bansa	·042	16·53	393·59	13·91	12·72	1·23	1·13	88 8	82·1	68·5	57·0	
32	Puri	·036	6·98	178·67	11·84	12·83	1·40	1·49	75·8	80·4	68·5	61·1	

TABLE C.—*contd.*

Serial Number.	Name of Cane.	Area in acre of both original and check plots.	Outturn of both plots in cwt.	Outturn per acre in cwt.	Result of analysis.								Remarks.
					Percentage of Sucrose.		Percentage of Glucose.		Quotient of Purity.		Percentage of the juice in the cane.		
					Analysed in January	Analysed in February.	Analysed in January.	Analysed in Februarv.	Analysed in January.	Analysed in February.	Analysed in January.	Analysed in February.	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
33	Rheora Benares	·036	13·40	372·22	12·97	...	·47	...	86·1	...	60·0	...	
34	Keswar	·036	11·57	315·83	13·36	...	·48	...	87·6	...	60·0	...	
35	Sukli	·036	10·47	290·83	13·20	13·42	1·28	1·34	82·3	82·3	72·4	60·9	
36	Rheora	·036	15·42	428·33	14·59	...	·28	...	88·8	...	43·5	...	
37	Buxaria	·036	16·53	459·60	13·98	...	·58	...	88·4	...	57·7	...	
38	Mungo	·042	14·69	349·76	12·86	...	·53	...	85·9	...	61·1	...	
39	Red Tana	·042	21·30	507·14	15·59	...	·88	...	90·5	...	68·0	...	
40	Lewari	·042	19·17	456·42	13·96	...	·11	...	84·9	...	56·3	...	
41	Yuba	·042	12·56	299·04	10·94	11·49	1·06	1·32	76·3	76·7	63·0	50·0	
42	Ketari I.	·036	14·69	408·05	12·96	...	·58	...	81·0	...	62·8	...	
43	Barukha	·036	14·03	389·72	13·02	...	·86	...	80·9	...	61·4	...	
44	Chynia I.	·036	13·96	387·77	12·61	13·54	1·19	·98	76·7	80·0	69·0	47·1	
45	Poraya	·036	14·69	408·05	14·30	...	·28	...	87·6	...	57·4	...	
46	Shaker Chynia	·036	44·69	408·05	13·45	...	·74	...	86·0	...	64·5	...	
47	Mango	·036	12·56	348·88	14·06	...	·35	...	89·3	...	55·4	...	
48	White Tana	·042	13·06	310·77	13·01	...	·81	...	77·4	...	73·2	...	
49	Manaria	·042	16·89	402·14	10·80	...	1·19	...	76·9	...	63·6	...	
50	Kewali	·042	15·42	367·14	12·78	...	·86	...	76·8	...	75·7	...	
51	Lata	·042	15·24	362·85	11·42	...	·93	...	79·4	...	61·6	...	
52	Paunri	·036	15·06	418·33	13·07	...	·51	...	85·5	...	58·1	...	
53	Khagri	·036	13·59	377·90	12·55	...	·70	...	83·3	...	64·8	...	
54	Chynia II, ...	·036	12·86	356·61	11·32	13·77	1·19	·93	76·2	82·1	63·7	47·6	
55	Nargari	·036	18·91	525·27	12·94	14·92	1·53	·99	80·6	82·7	63·0	34·7	
56	Khelia	·036	19·83	550·83	13·80	14·14	1·22	1·09	82·2	81·6	61·5	46·1	
57	Khari	·036	22·45	622·22	13·05	...	·65	...	82·5	...	66·0	...	
58	Juba	·039	12·33	316·15	12·04	...	·98	...	80·6	...	64·8	...	
59	Pawrah	·039	15·06	386·15	15·79	...	·26	...	84·3	...	59·5	...	
60	Shamsara	·006	1·46	243·33	17·65	...	·61	...	93·0	...	52·8	...	

M. M. MACKENZIE,

Superintendent, Sepaya Farm.

TABLE D.

Statement showing the details of Machinery and Implements in Stock during the year ening 30th June 1918.

Serial No.	Names of Machinery and Implements.	Number.	Remarks.
1	2	3	4
1	Tangye's Combined Pumping Engine and 6" Centrifugal Pump with fittings.	1	
2	Carter's Disintegrator or Surki Mill	1	
3	" Albion "Reaper	1	
4	Marshall and Son's Threshing Machine 54" drum with Elevator.	1	
5	Richmond and Chandler's Oil Cake Breaker ...	1	
6	Hand Colonial Lift and Force Pump	1	
7	Rajah Ploughs	26	
8	Spring Tooth Harrow	12	
9	Two-Ton Weigh-Bridge	1	
10	Horse Hoe	4	
11	Improved Multiplex Chaff-cutter, Richmond and Chandler.	1	
12	Richmond and Chandler's Corn Crusher ...	1	
13	No. 10 Automatic Feed Baling Press ...	1	
14	Howard's D-3 Ploughs	8	
15	Ridging and Subsoiling Ploughs	2	
16	Rajah Lever Harrow, double	1	
17	Chain Harrow...	1	
18	Country Ploughs	20	
19	Portable Engine 8 Horse Power, Marshall Sons & Co., Limited.	1	
20	J. and F. Howards' Sectional Roller 6' x 20" with angle and brackets.	1	
21	Hand Rotary Lift and Force Pump and Pipes, etc., for water service.	1	
22	Meteor Rover Roadster Bicycle	1	
23	Surat Carts	5	
24	Country Carts...	2	
25	One-Bullock Carts	2	
26	Sampany	1	
27	W. I. Piping Complete for water service for Cowstalls.	1 se.	
28	Scraper	1	
29	Climax G. 3 Ensilage Cutter	1	

M. M. MACKENZIE,
Superintendent, Sepaya Farm.

TABLE E.

Statement showing total Receipts and Expenditure during the year ending 30th June 1918.

Serial No.	Receipts.	Amount.	Remarks.	Expenditure.	Amount.	Total.	Remarks.
1	2	3	4	5	6	7	8
		Rs. a. p.			Rs. a. p.	Rs. a. p.	
1	Sale of Milk ...	913 9 11		PARTICULARS.			
2	Sale of Heifers and Calves.	574 0 0		I. Establishment :—			
				1. Salary of the Superintendent.	11,700 0 0		
3	Sale of Bulls ...	750 0 0		2. Salary of Staff ...	3,187 10 3		
4	Sale proceeds of Farm produce.	791 11 5		3. Pay of Temporary Establishment.	3,079 5 7		
5	Miscellaneous receipts	47 4 3				17,966 15 10	
				II—Travelling Allowance :—			
				1. Travelling allowance of Superintendent.	568 8 0		
				2. Travelling allowance of Staff.	231 15 3		
						800 7 3	
				III—Contingent charges :—			
				1. Purchase of Cattle	4,250 0 0		
				2. Feed of Cattle ...	11,126 14 3		
				3. Purchase of Seeds	689 0 3		
				4. Do. of Manure	911 4 0		
				5. Do. of Implements.	1,061 5 0		
				6. Wages of Farm labourers—			
				(a) For cultivation	5,699 10 2		
				(b) For Laying out	833 0 0		
				7. Petty construction and repairs.	1,113 7 6		
				8. Railway and Steamer Freight.	281 7 0		
				9. Cooly and Cart hire	88 3 6		
				10. Service Postage and Telegram charges.	189 15 6		
				11. Rent, Rates and Taxes.	2,146 13 6		
				12. Cold and hot weather charges.	79 8 0		
				13. Purchase and repair of furniture.	14 6 0		
				14. Office Expenses ...	76 3 3		
				15. Miscellaneous contingencies.	2,606 0 0		
						31,164 1 11	
	Carried over ...	3,076 9 7		Carried over ...	...	49,931 9 0	

TABLE E—*concld.*

Serial No.	Receipts.	Amount.	Remarks.	Expenditure.	Amount.	Total.	Remarks.
1	2	3	4	5	6	7	8
		Rs. a. p.			Rs. a. p.		
	Brought forward ...	3,076 9 7		Brought forward ...	...	49,931 9 0	
				IV—Non-Recurring charges :—			
				1. Construction of Bull Stalls.	733 8 9		
				2. Construction of Cartshed.	500 0 0		
				3. Cost of sinking Well.	79 12 9		
				4. Construction of Cow stalls.	3,051 15 6		
				5. Extension of present Godown.	1,693 14 9		
				6. Extension of Drain	194 0 0		
				7. Cost of fencing additional area.	2,074 0 3		
				8. Cost of levelling additional area.	95 0 0		
						8,422 4 0	
	Grand Total ...	3,076 9 7		Grand Total ...	...	58,353 13 0	

M. M. MACKENZIE,
Superintendent, Sepaya Farm.

E. & O. G. P. (Agri.) No. 46—390—9-1-1919—R. B.

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on 31 October, 2019